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THE AUTOMOBILE

Jersey's Chinese Wall Finished

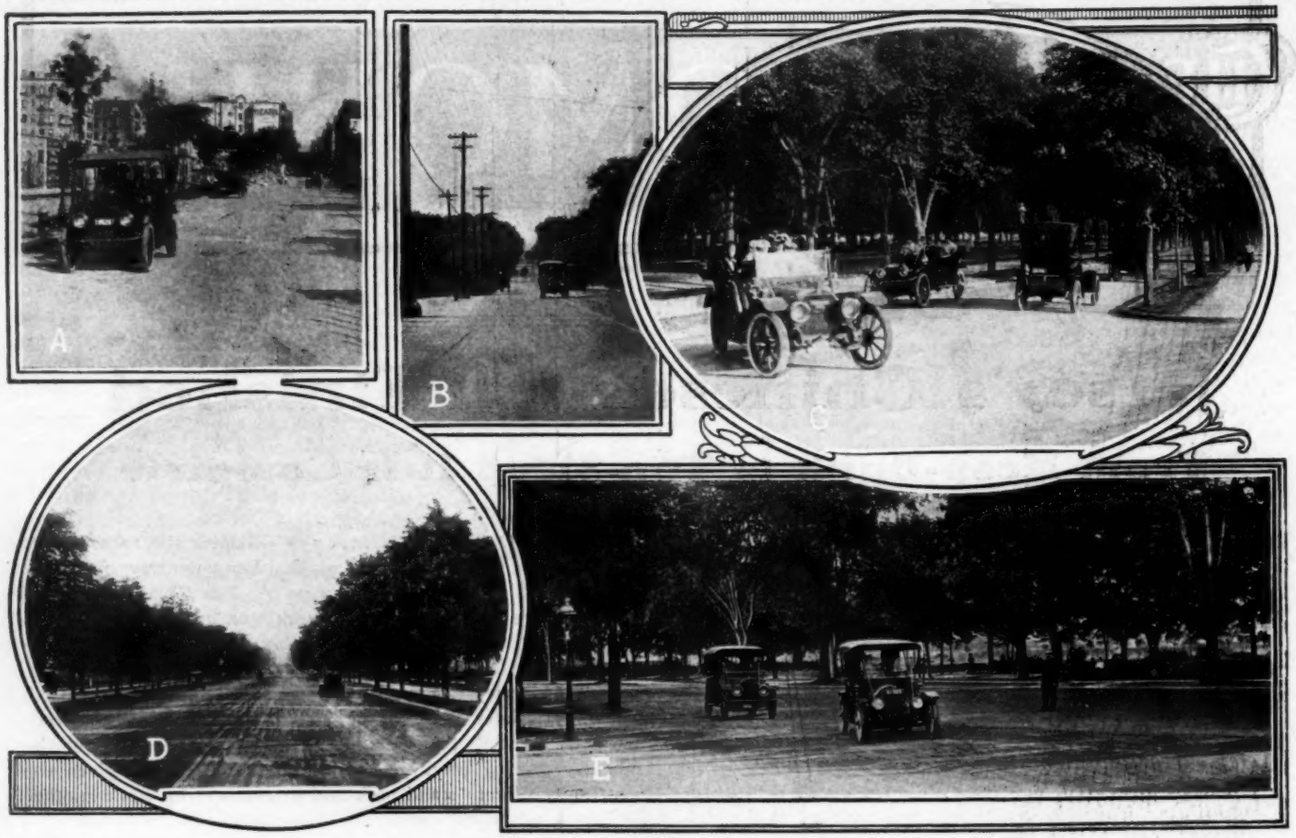
From Heap-Bunk to Top-Sleep It Is Complete

Counterpart of the Great Wall of China, erected by the State of New Jersey to prevent an invasion of American foreigners in automobiles, is finally finished and the last loop-hole, the eight-day touring license, has been abolished. From now on the good roads of Jersey will be almost wholly used by residents, and civilization, as expressed in the development of transportation, will take a backward step. Horse-drawn traffic seems to be unduly emphasized in comparison with its importance and automobiling within the State has received a set-back.

AFTER Quing Wong Duck (or whatever the name of the last Chinese Emperor of the Ming dynasty may have been) completed the Chinese Wall and had it inspected he stood back and said that his work was one of the wonders of the world. Since then succeeding generations have pronounced King Duck's judgment excellent.

After the Jersey Legislature had enacted the Frelinghuysen bill into law, and later modified the law so that Motor Vehicle Commissioner J. B. R. Smith had it in his power to wipe out the eight-day touring privileges, all those interested are given the opportunity now to stand back and pronounce the work another wonder of the world.

JERSEY'S AUTOMOBILE LAWS HAVE ERECTED A VERITABLE CHINESE WALL ABOUT THAT STATE—THE MAN WHO IS ADMINISTERING THEM



A—Between 5th and 6th avenues, New York, looking along 110th street, showing automobile activity

B—A steady stream of cars pass out of New York in the direction of Yonkers

C—Some of the cars that form a constant flow from New York to the Long Island beaches

D—The boulevard as can be seen in this picture is bristling with automobiles

E—The speedway being interdicted to automobile traffic. Automobiles are compelled to make a detour

Both walls were built with the same object in view—namely to foil invaders. The Chinese wall was constructed westward from the Gulf of Pe-Chi-Li along the northern boundary of the empire and when it was finished it measured 1,250 miles in length. It is still 35 feet high and 21 feet wide in long stretches and has watch towers scattered along its whole extent at varying intervals.

The New Jersey Chinese wall extends from Jersey City-Foo Chow, northward nearly to Tappan-Chung and then westward to Port Jervis-Quong Ding and then south through Delaware Water Gap-Ping Bung and east of Philadelphia-Top Sleep to the southwestern corner of New Jersey-Shan Tung to Cape May and north along the Atlantic Ocean through Atlantic City-Heap-Bunk, to Jersey City-Foo Chow again. The wall is a million feet high and half a million feet thick, or at least such an estimate has been placed upon its dimensions by certain New York, Pennsylvania, Delaware and Massachusetts automobilists who have been brought into contact with it.

The Chinese Wall was built because the Chinese believed they had such a fine country that the savage hordes on the north coveted it and sought to plunder it, but the reason for the Jersey wall is two-fold. In the first place Jerseyites have had an extraordinarily good opinion of Jersey roads. They have little else to be proud of in a public-spirited way and consequently they emphasize the beauties of their roads. In fact they think so well of them that they do not want foreigners (*i. e.*, Americans) to enjoy them. Secondly, if the aforesaid foreigners insist on enjoying the roads, why not turn an honest penny?

In times past rapacious country constables and venal peace officers made handsome profits from levying fines for alleged violations of the law. Frequently these fines were paid on the spot, thus relieving the "offender" of the necessity of attending court, and possessing numerous advantages, financial and otherwise, for the constables and others. This became so flagrant after awhile that the State suddenly realized that it was overlooking something good and then the present law was passed.

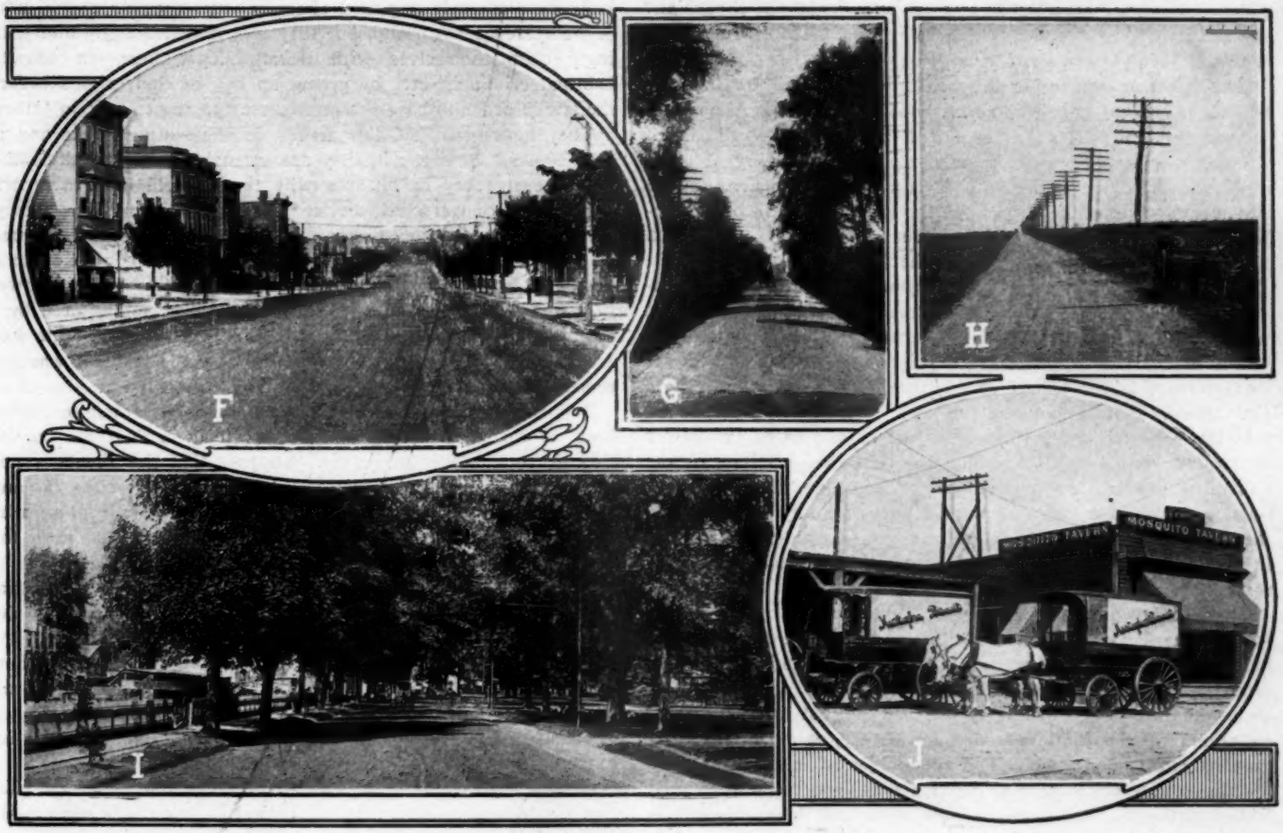
Under this law power was delegated to the Motor Vehicle Commissioner to enforce the law which requires a full season's license from every foreign and native, without benefit of clergy.

One little mitigating circumstance was inserted in the law, which provided for a limited touring license within the sacred precincts, if similar provision had been written into the State law of another State with regard to Jersey citizens. This limited license cost $1 and was good for eight days' riding. Under all the circumstances, eight days in Jersey ought to be enough for any "foreigner" and the arrangement worked fairly well for a while.

Then Commissioner Smith discovered that New York, Massachusetts and Pennsylvania, while opening their magnificent highways to each other, would not have anything to do with Jersey on that basis. The attitude of Jersey in demanding its ounce of flesh from every tourist was called by various unpleasant names, the least offensive of which was "pea-eyed infinitesimal."

New York's grand highway system was open to the Quaker brethren and Massachusetts freely welcomed both families, but as Jersey wanted its dollar a head from every "foreigner" under the most favorable circumstances and a full year's license whenever possible, the doors were slammed against the "thrifty" little commonwealth which lies at the south end of the New York and Philadelphia drainage systems.

Then Commissioner Smith, by virtue of the power which has been construed to reside in him, decided to call in the eight-day licenses or at least to issue no more to the citizens of the "foreign" States and the last loop-hole in the great Jersey



F—This shows the deserted state of the Hudson County Boulevard, a magnificent Jersey highway

G—Jersey possesses some beautiful roads, where the horse can go unmolested

H—The turnpike across the marshes is like the Deserted Village

I—Village streets are covered with leafy bowers, but automobiles are conspicuous by their absence

J—Mosquito Tavern, a pull-up for wagonmen, offers little inducements to automobiles

Chinese Wall was plugged up from the inside and clinched from the outside.

Aside from the fact that all interstate legislation touching automobile traffic is unconstitutional, invalid and void, and will so be pronounced eventually, the situation that has developed is miserable from every point of view.

New Jersey has a large number of automobiles, many of the owners of which have business in New York, Philadelphia and elsewhere. It costs a material sum for the native of New York to gain official sanction from his home State to operate his automobile, and the same may be said for Pennsylvania and residents of other States. But it does not cost the Pennsylvanian a cent to motor in New York if he is in good standing at home, because the Pennsylvania law allows New Yorkers to use the Pennsylvania roads if they have satisfied the legal requirements at home.

Thus, while it only costs the Jerseyman, say, $10 a year for license to operate his car within the State, it costs him dear if he tries to escape. One plunge into New York means a full year's fee; one little slip into Pennsylvania calls for the entire face value of a yearly license and if after making these two excursions the Jerseyman trundles into Massachusetts he is set back for a yearly touring license which will be graciously issued at a price, on behalf of the Old Bay State.

When he gets out of his own bailiwick his Jersey license marks him as fair prey. Everybody knows what happens to one in Jersey under the same circumstances and as a means of reprisal, knowing that the Jerseyman would reverse the positions if he had the power, the "foreigner" plucks him to the bone, without a pang of conscience.

It costs the citizen of Jersey every time he ventures into untried territory and it costs the "foreigner" who invades Jersey. But that is all as far as the "foreigner" is concerned. No other State demands its pound of flesh and gets its ounce except Jersey.

The result is now becoming painfully apparent. Jersey is declining as a touring ground for "foreigners." The magnificent roads are slowly being pecked to pieces by horse traffic and automobiles from outside are growing less and less in value. Automobilists call emphatically to the Touring Club of America and the *Blue Book* for routing directions that will bring them to certain objective points in the South and West without touching Jersey and such information is cheerfully furnished.

In order to show that the attitude of Jersey is deliberate about this matter it may be cited that at the last session of the Legislature one of the solons in contesting the reasonable measure that was being considered said: "This bill must not become a law, because if it is enacted, throwing the State open to automobile touring, our roads will be lined with cars and cannot be used with comfort by our own people."

If such a result could be accomplished by the passage of a law opening the State, it would not hurt the feelings of hotel proprietors, restaurant keepers, garage men, real estate owners who appreciate an advancing market or business men in general who like the idea of plenty of outside money as a motive force for inside business. But far and away the most pleased section of Jersey citizenship would be the dealers in automobiles.

Every little obstacle in the way of pleasurable use of the car limits the market for more cars and when such an obstacle as the Jersey Chinese wall is interposed, the deleterious effect must be felt widely in the course of time. The accompanying pictures illustrate a few of Jersey's fine roads and as they were taken at a time of day when the roads might well be covered with traffic, the absence of automobiles indicates that the wheels of progress have been checked. On the other hand, in the illustrations

pictured on Long Island and in other spots outside of the "Wall" the presence of traffic shows that something must be the matter with the Jersey territory.

The law hampers traffic and consequently is bad for business as well as being oppressive to citizens of Jersey and to Americans.

Now the real reason for complaint against the "Wall" is, of course, to a certain extent founded upon the mulcting of automobilists for a money fine, as if there was something criminal in the operation of a car *per se*, but the greater portion of the objections raised do not take the mere money into consideration at all. The chief "beauty" about the Frelinghuysen law is the fact that after the American "foreigner" has paid his yearly license to tour one day in Jersey he must acknowledge that he is incompetent before the law if not actually criminal by signing a power of attorney empowering the Secretary of State to accept legal service in his behalf in case the peace officers or others shall suspect him of violating the law.

If the solons had gone one step further and made the power of attorney broad enough so that the Secretary of State or the Commissioner of Motor Vehicles or someone else could not only accept service but also enter a plea of guilty on behalf of the American in a criminal action or to confess judgment for him in the civil courts the intent of the solons would have been better served.

The legal attitude of the State of New Jersey is an anachronism. It harks back to another age—an age when savage tribes held mountain passes between populous centers and exacted toll from every passer on the highway. There is a disregard of ethics, gentility and fairness in the attitude, but as in all other situations of the kind recorded in history, it must work its greatest harm upon itself. The advantages of quick transit are too thoroughly understood to require argument. The history of transportation is the history of civilization and the automobile is the highest light in the bright pages.

Whatever is done to check transportation and easy communication tends to destroy civilization and points toward chaos.

Jersey has taken a step in that direction in attempting by law to make the use of the automobile unsatisfactory.

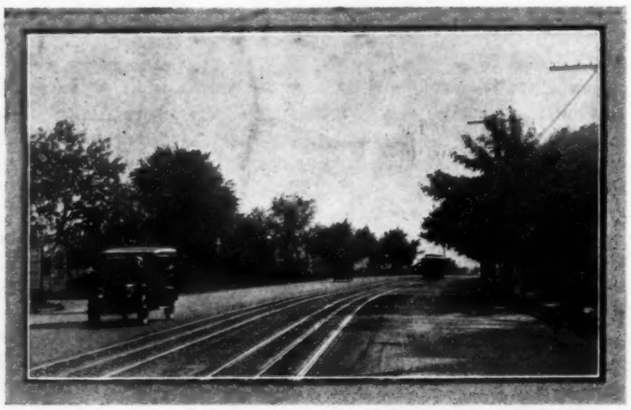
Ordinarily the pleasure automobile is used for its owner's enjoyment. Too frequently he cares nothing what its operation costs and is careless about all the various items of expense that go to make up the grand total. There are hundreds of automobile owners in New York who pay all their automobile bills without giving them the critical analysis that they would if the bills represented some element of a business transaction. The $10, or whatever it is, that it costs for a Jersey license would not be considered for a second as an obstacle to the enjoyment of the automobile owner and yet this autumn will see fewer New York, Pennsylvania and Massachusetts automobiles in Jersey than any year since 1907.

Surely this is not because the owners of the cars balk at the idea of spending $10 more. The fact of the matter is that they will not take out Jersey licenses because they cannot do so and maintain their self-respect. They feel that they do not wish to be hampered territorially, but they will not knowingly and willingly class themselves with ticket-of-leave men, ex-convicts, habitual criminals, etc., by giving up any of their rights before the law in order to have the privilege of paying to tour in Jersey.

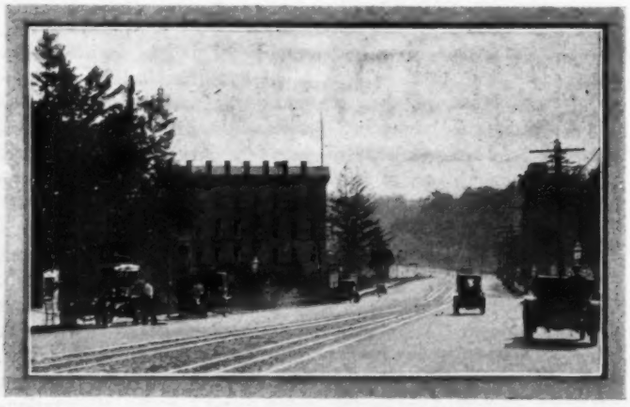
They figure that the law stands on the statute books and if they evade it or break it, they are amenable to its penalties and consequently they cannot see why they should hand over the legal right of personal service to an officer of New Jersey, while at the same time the resident of the State is only deemed to be guilty of any crime after due service and conviction in a competent court. Under the nauseous and un-American "Power of Attorney" clause, judgment by default could be entered by a court against a non-resident after the Secretary of State had accepted service in the case, providing the non-resident was not represented in court.

Suppose that a tourist was charged with exceeding the speed laws, or carrying two licenses, or breaking some traffic regulation by some officer in Jersey. Suppose that the alleged crime or misdeamenor was not noticed by the occupants of the car and the officer complaining of the breach of the law was not seen by any member of the party. It is perfectly possible that after the constable has made his complaint and legal service accepted by the Secretary of State that the case should come on for trial without the slightest knowledge of it having reached the defendant. Suppose that the party continues its way out of the State and tours indefinitely through the South, for instance. Upon his return to New York it is conceivable that the owner might discover that during his absence the limit penalty of the law had been imposed upon him. Of course, that would be an extreme case, but there is nothing impossible about it.

A staff representative of THE AUTOMOBILE and a photographer made a tour over a number of typical Jersey roads recently in quest of illustrations for this article and considerable care was exercised in getting accurate pictures showing actual conditions.



L—The surface of the Yonkers road has been worn smooth by automobile tires



K—Automobile activity along one of the roads leading out of New York

The trip was made on a week-day between the hours of 2 and 6 o'clock on a pleasant afternoon. The paucity of automobiles was painfully noticeable throughout the trip, as will be noted from an examination of the pictures.

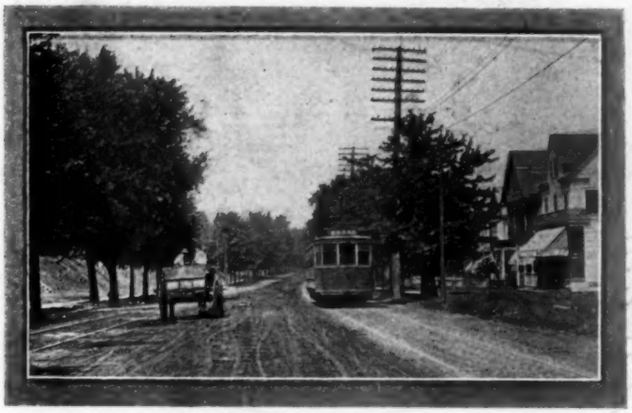
The direct opposite is shown in the pictures taken in and around New York, where every street has cars upon it almost every hour in the day. It costs Americans considerable money to avoid New Jersey and considerable chagrin to think that they are barred from the "sacred precincts," but it costs the Jerseyites much more in money and loss of trade and conditions are gradually developing that will bring these facts keenly to the notice of the Jersey citizen who does not want foreign automobiles to use his roads.

The automobile manufacturing business with its accessory branches and allied interests ranks third in the United States in value. It is growing each season and will continue to grow, according to all indications. This industry was not raised upon

such laws as that which disgraces the statute books of the Jersey commonwealth. Such laws are a detriment to the automobile business and consequently to transportation, which means civilization.

There is little comfort to be derived from contemplating the immediate legal future in Jersey, but the life of the present situation must prove short. There are a lot of excellent Americans living in the State. They are not fond of the status of affairs and in the end they will win and the great "Wall" will be shot as full of holes as is its counterpart on the north line of the Flowery Kingdom.

They really represent the American spirit of Jersey and despite the fact that they have not succeeded in abolishing the Frelinghuysen law to date, they earnestly oppose it and if intentions ever forecast action the law will be torn from the books the next time the people of the State have an opportunity to voice their wishes.



M—A view of one of the Jersey main roads with its trolley cars and wagons

N—This fine stretch leading from New York into Jersey is given over almost entirely to horse-drawn vehicles

Mud-Splashing Omnibuses

The nuisance has become so aggravating on the streets of London that the matter has come up in Parliament. It is proposed to scotch the evil by compelling the 'bus companies to equip their vehicles with mud-guards.

THE question of mud-splashing by motor buses in London has become so pertinent that it has got into Parliament, where no less a personage than the Home Secretary, Mr. Churchill, has taken a hand in the matter. So aggravating had the nuisance become, that a meeting of London representative bodies was held at Stratford, as a protest. This conference, "representing twenty-one local authorities in Greater London," having become cognizant of the serious damage and annoyance to persons and property caused by the mud splashed from the wheels of motor omnibuses, "and having regard to the refusal of the Commissioner of Police to take reasonable steps to obtain an abatement of the nuisance," called upon the Home Secretary to intervene and to require the Commissioner of Police to make it a condition of his license that all motor omnibuses plying within the limits of his jurisdiction should be fitted with mud guards.

To all of this, the Home Secretary replied that the reason the Commissioner had not not made the regulation insisting on the use of some form of mudguard which would prevent the nuisance was that, in spite of inquiry, inspection and actual trials, no mudguard had been found which did not entail serious disadvantages and danger. Therefore, he said, "I could not ask the Commissioner to enforce the use of special mudguards till a suitable type is invented." Meanwhile, the motor omnibuses go on splashing mud and the representatives of the twenty-one local authorities in Greater London continue to fume and protest.

CARELESS USE OF COTTON WASTE—The interior of enclosed bearings should never be cleaned with cotton waste just before they are finally assembled. Small particles of the waste are apt to be picked up by the oil and carried to a spot where they will effectually clog the oiling system.

New England Hills Free from Heat

Tour of the White Mountains Attractive

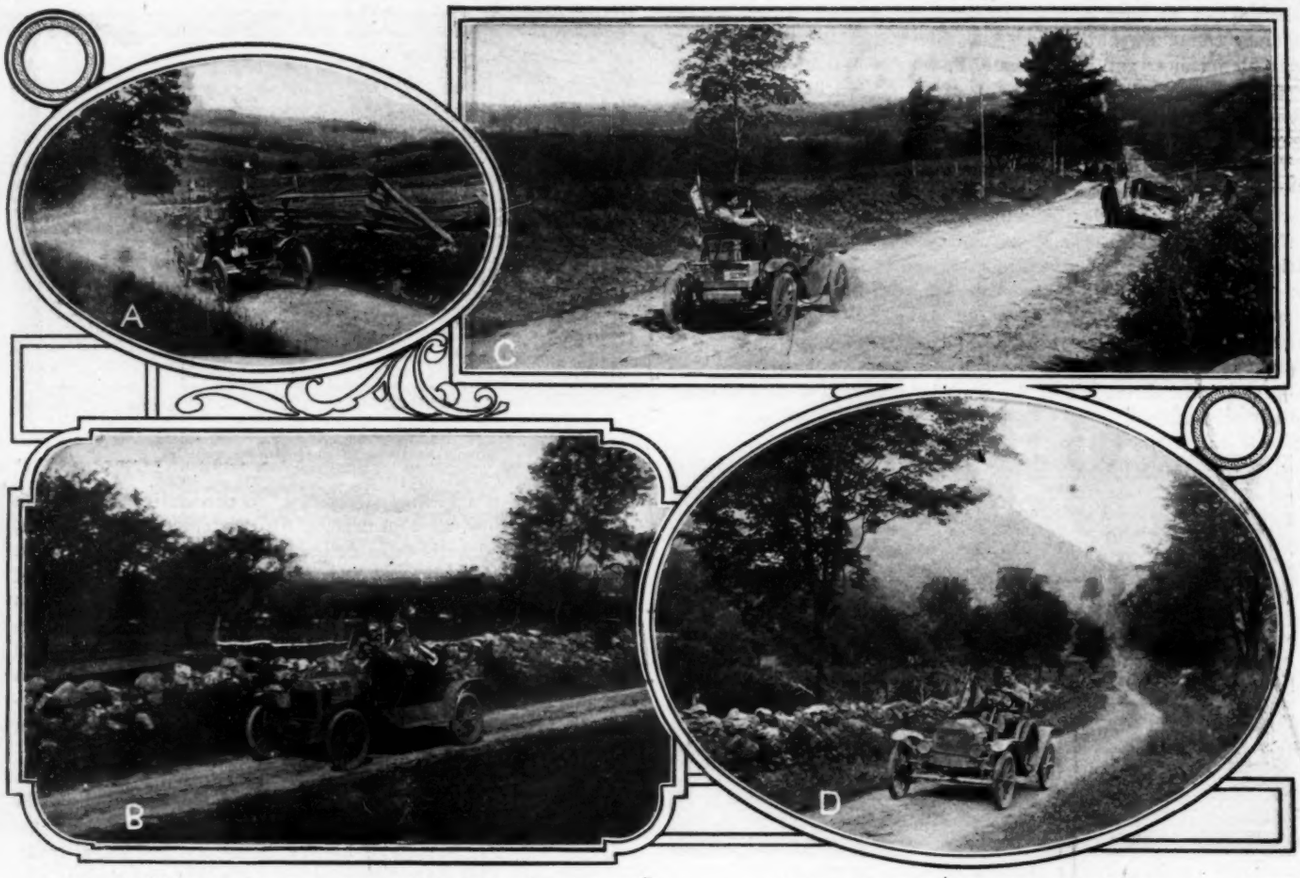
When a change from city or seashore is desired, the automobilist can enjoy the lake country, forest and mountains with a minimum of bother and preparation. One of the most delightful tours possible to take in this section of the country is the two-day run across the White and Green Mountains, passing the celebrated Bretton Woods high in the hills. The scenery is far and away the finest in New England, and many consider it a rival of the Alps.

MAINE, New Hampshire, Vermont and Northern New York are particularly attractive at this time of the year to automobilists, and a trip through the White, Green and Adirondack Mountains holds out compelling charms during the vacation season. When those who may be summering on the Maine coast feel the slackening of interest in the sea and the rocky headlands and the desire to move and see something else becomes a conscious thought, the following suggestion for an automobile tour may strike a responsive chord.

A leisurely run of two days, which may be extended into three or four as fancy dictates, through the Maine forests, across New Hampshire and Vermont to Lake Champlain and as much further as the party wishes affords an opportunity to enjoy the scenery in New England in perfect comfort as regards excessive heat.

Even an ordinary car can negotiate the grades with ease and maintain a running schedule that will be satisfactory. Aside from comfortable underclothing and waterproofs, no special equipment is required for the trip through the mountains.

Starting from Portland via the direct route, which is Route



A—Leaving Montpelier on the last climb of the second day
B—Striking north from the city of Portland, Me.
C—Bethlehem in the highlands of the White Mountains
D—Between the White and Green Mountain ranges

611 of Volume 2 of the *Blue Book*, the road trends northwest, crossing the Presumscot River at Riverton and then skirting Duck Pond on the right, getting a glimpse of Sebago Lake after passing North Windham. Running along the shore of this wonderfully beautiful lake the course passes Naples and then follows the shore of Long Lake to Bridgeton. The main villages and towns passed on this route between Portland and Bridgeton are Morrills Corners, North Windham, Raymond, South Casco, Naples and Bridgeton. The mileage is 39.2 through typical Maine surroundings.

Every few miles a wonderful lake scene is spread before the eyes with its setting of rugged hills and every gradation of green that the forest is capable of producing. From Bridgeton the way leads to East Fryeburg and then Fryeburg, where the foothills of the White Mountains begin to loom up like an impassable barrier to the progress of the car. Just beyond is the State line of New Hampshire at East Conway and at North Conway the route joins Route 403. The mileage thus far is 64.8 and makes just a nice, comfortable all-the-morning run.

Luncheon may be taken at Intervale, a couple of miles further along the way, and after a mid-day rest the remainder of the day's run may be made with ease to Bretton Woods. The road follows a northerly course and swings westward after passing Lower Bartlett.

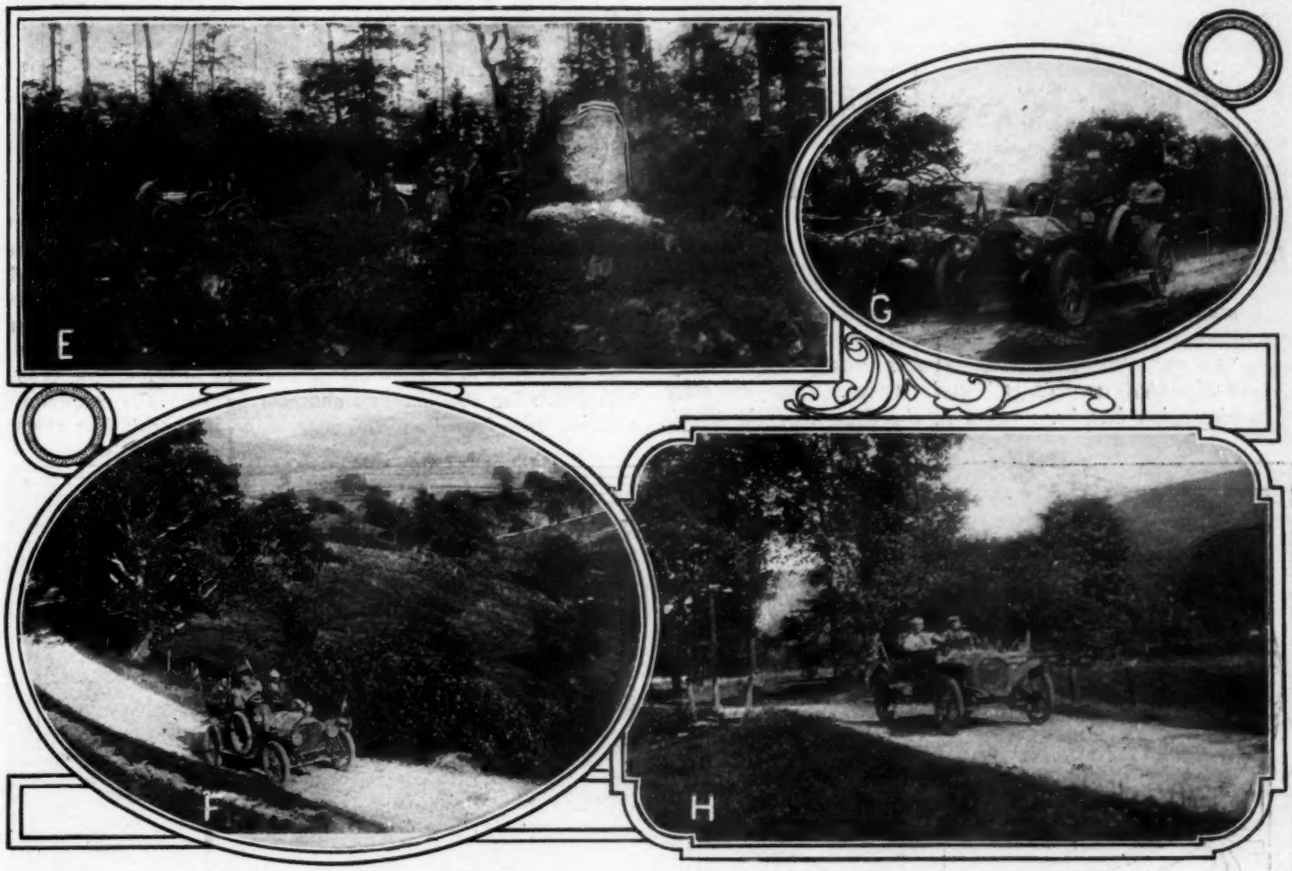
Winding south and then west the road passes Bartlett and continuing west enters the rugged hills. At Sawyer's River the road turns north and climbs past Bemis, Carrigan and Wiley's to the Crawford House. The feature of the day is the passage of Crawford's Notch, a natural gorge through the mountains, that has an interesting legendary history.

It is recorded locally that prior to the Revolutionary War a pioneer named Crawford carried the mails into the little-known Northwest and that he was offered a big land grant if he could lay out a mail route that would shorten the distance between the seaboard and Quebec. Crawford while hunting in the highlands happened to lose his horse and in climbing a tree to get his bearing saw the notch-like groove in the crest of the mountains that seemed to afford the possibility he sought. He did not pass over the notch at that time and the war coming on prevented him from pursuing his explorations until after peace had been secured. Then he received a renewal of the offer by the Government and the test was to be his ability to lead a horse across the mountains. Crawford did this, according to the historians, and won the land grant.

To-day the rigors of the notch have been much ameliorated by road improvements and the cutting down of some of the stiffest grades. From Crawford's the way is through a wild and interesting country to Bretton Woods, where the night stop may be made at either of several creditable hotels. The Mount Washington House, facing toward the giant peak of the range and housing among other conveniences for the automobilists a branch of the Touring Club of America, is a magnificent stopping place, although there are a number of others excellent in every respect.

The day's run by this route is 95.2 miles and is altogether desirable from every point of view. The roads are frequently based upon gravel and well maintained, while in the main they are of dirt, but really rank high in that classification. There are some long steep grades, but they are not excessive and with due care there is no room for fear of mishap.

The second day's trip is via Route 477 to St. Johnsbury, Vt., passing along the Ammonoosuc River and various big resort hotels to Bethlehem and then Littleton. Thence through Waterford, crossing the Connecticut River, the road reaches St. Johnsbury, 37.6 miles across the western foot hills of the White Mountains and entering the ascent of the Green Mountain range. It may be well to take it slowly and enjoy this short run, for there



E—Lowell's Mount, near Fryeburg, Me.
F—Where the Green Mountains smile near Burlington, Vt.
G—Just before the road winds away in Bretton Woods, N. H.
H—Just before crossing the New Hampshire State line

is little in New England that equals this region in scenic beauty.

Route 591 is the accepted way from St. Johnsbury to Burlington and it leads through a country of much charm scenically and much interest historically. The White Mountains have a distinctive, ghostly white aspect viewed at a distance, especially in the twilight, but the hills to the west are as green as verdure even when the searching rays of the sun are glaring upon them. The reason lies in the coloration of the rock in each case. In the White Mountains there is probably an element of limestone that shines white, while the granite of the Green Mountains lends that range its characteristic hue. The tourist will search in vain for a reason for this difference if he confines his investigation to vegetation.

Passing Danville, after steep down and up grades, the road touches West Danville, South Cabot, Marshfield, Plainfield and into Montpelier, the State capital. There is a winding, picturesque road from Montpelier to Waterbury and a few miles further on there is a 15 per cent. hill, which fortunately is short. Reaching Jonesville, the road is up and down to Richmond and after passing that place the way is mostly up until the crest of French's Hill is reached. Looking back over the road and across the valley the view from the hill top is superb. From there to Williston and into Burlington the route is comparatively easy.

The mileage from St. Johnsbury to Burlington is 78.4 and a good five hours will not be wasted in traversing it. If the start from Bretton Woods is made at 9 o'clock in the morning and at least three hours spent in reaching St. Johnsbury, where an hour at most should be spent in refilling with gasoline and oil and getting luncheon, the way to Burlington may be taken up at 1 o'clock and by 6 o'clock the day's journey will be finished.

Such a trip will be memorable. It is like nothing else in this part of the land and for varied beauty and interest rivals anything in the world. The sight of the Vermont valleys from the tops of the mountains is poetically lovely and the roads are not bad, especially in dry weather. There are a few stretches of sand and heavy going, but in the main the going will be found to be fair where it is not better.

All told the day's journey is 116 miles long and at least eight hours of running should be used in making it.

From Burlington there is a choice of numerous interesting routes, particularly the tour to Canada, the one to the north end of Lake Champlain and down the New York side past Plattsburg to Saratoga or to Ticonderoga and thence westward.

Difficulties Attending Exportation

The difficulty of obtaining spare parts without an enormous delay and at great expense proves a great barrier to foreign automobile trade. It would take a number of sales to make it profitable to maintain well-stocked agencies.

AMERICAN motor cars are not known in Frankfort-on-the-Main, Germany, and dealers do not care to take them up, as they consider it practically impossible, under existing circumstances, to work up a profitable business in handling them. In the first place, the various large German concerns can deliver excellent cars at prices which make foreign competition difficult. German manufacturers have a firm hold on the market and, with the exception of a few French machines, no foreign cars are sold or seen there.

In order to sell American motor cars there it would be necessary to keep up a stock either at Frankfort or some accessible point, where parts could be secured at short notice and where cars could be repaired.

The New Warren-Detroit Models

Describing Their Mechanical Features

In addition to the Warren "30" manufactured by the Warren Motor Co., of Detroit, Mich., two new models have been placed on the market by this concern. The "30" will in future be known as the "12-30," the two new models being respectively designated as "12-35" and "12-40." No material alteration has been made in the design of the "30."

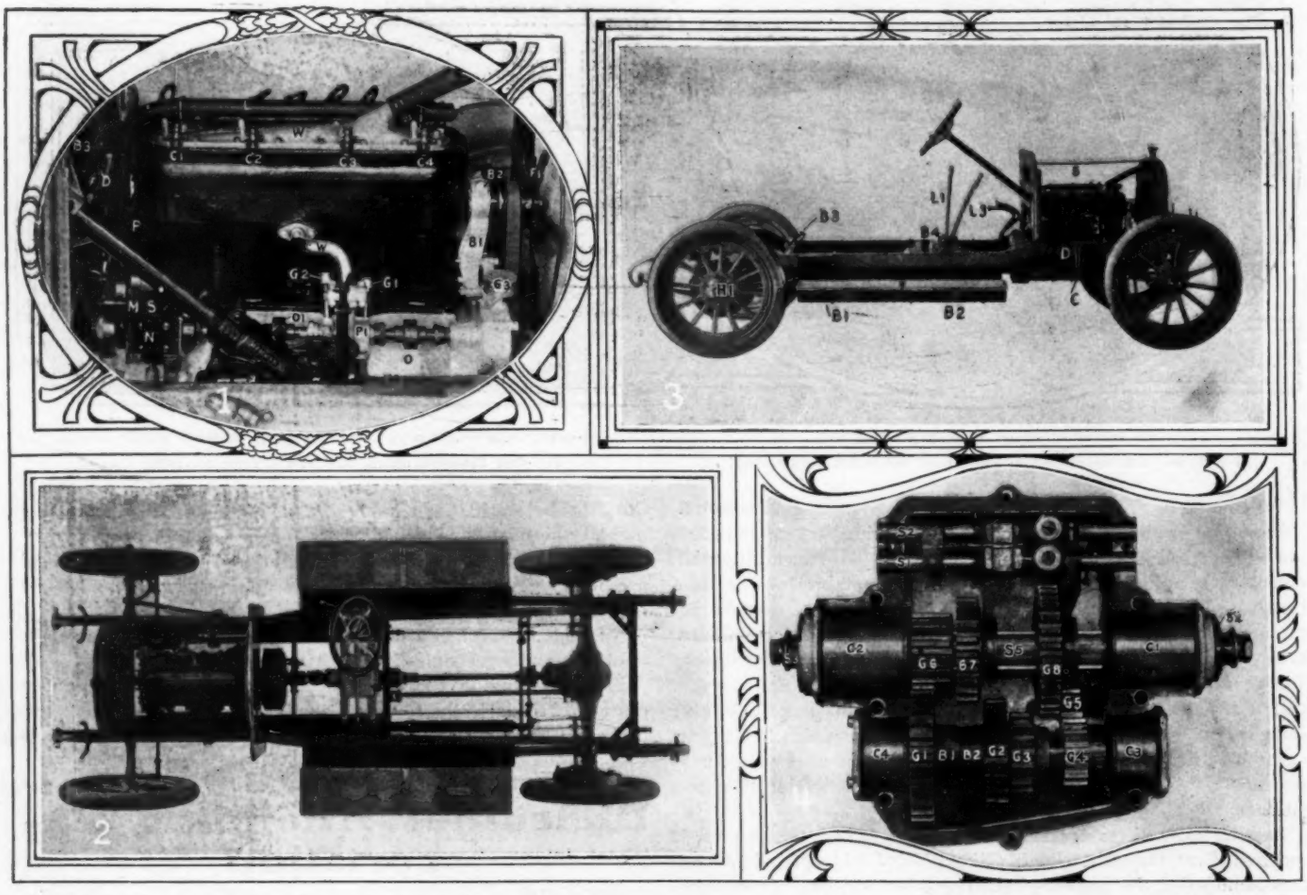


Fig. 1—Right-hand view of the Warren "12-40" motor, showing magneto, waterpump and steering gear

Fig. 2—Plan view of the new Warren "12-40" chassis, showing the general assembly of the units

Fig. 3—Side view of the Warren "12-40" chassis, presenting a clean exterior, showing the neat tool boxes

Fig. 4—Transmission of the Warren "35," with the top half removed, showing the relation of the gears

THE motor of the new Warren "40" is shown in Fig. 1, from which it may be seen that the cylinders are cast en bloc with an L-shaped head. It has four cylinders of 4 1-4 inches bore and 4 3-4 inches stroke. The illustration shows the right-hand side of the motor. The water cover W is of cast aluminum and extends the whole length of the cylinders, delivering the water through a rubber connection to the radiator. Compression cocks C1, C2, C3, C4 can be seen and these are fitted with priming cups in the event that it becomes necessary at any time to make an injection into the cylinders, as for instance, when starting in cold weather. The valves are located at the left-hand side of the motor and are 2 1-8 inches in diameter, the push rods, which are adjustable, terminating in revolving mushrooms. The valve springs are entirely enclosed by a neat removable aluminum cover, thus tending to silence the motor. The camshaft is a drop-forging, the cams being cast integral therewith, and runs on three phosphor-bronze bearings. The crankshaft is a drop-forging and runs in three main bearings which are also made of phosphor bronze. The connecting rods are drop-forged and the pistons are fitted with four rings.

A vertical shaft extending both above and below the motor is driven by suitable gearing from the crankshaft, the upper end operating a timer and the lower end driving the oil pump, which is of the gear type. The oil is taken from the lower half of the base chamber and forced by the pump through a sight feed situated on the dash to the four sumps below the connecting rods, the rotation of which atomizes the oil and forms the splash system. A carbureter of the float-feed type is located on the left-hand side of the motor, being attached to it by means of a bifurcated cast-aluminum intake manifold. The cooling of the motor is effected by means of a cellular-type radiator with 1-4-inch square sections. The water flows from

the radiator to the centrifugal pump P1 in Fig. 1, which is driven by the shaft O off the half-time shaft, delivering the water through a single pipe to the center of the cylinder casting. Greasers G1 and G2 are provided on either side of the pump in order to maintain the efficient lubrication and prevent the water leaking through the packing glands, of which there are two. The pumpshaft is extended to the rear and drives the magneto, which is of the Bosch high-tension type. The magneto M rests upon a ledge formed by one of the arms of the motor and is attached thereto by means of a steel band S and the clamp N. In addition to the magneto an independent ignition is provided by means of a high-tension distributor and single-unit coil, which is located on the dash, the distributor being situated on the right-hand side of the motor. Fig. 2 shows the method of suspending the motor upon a sub-frame by means of four arms cast integral with the upper half of the aluminum base chamber. The front end of the crankshaft, which carries the master pinion of the timing gear set, is extended through the

certaining the correct amount of oil that should be in the motor as well as providing a means of emptying all the oil.

The clutch is of the conventional cone type, the male member being of cast aluminum and faced with leather. The springs that maintain the tension have adjustable slips, and the shifting yoke ring fitted with ball thrust is made so that it can be readily removed. Between the clutch mechanism and the transmission there is a short shaft, each end of which carries universal joints all made of steel forgings. Fig. 6 shows the general assembly of the transmission, which is located amidships and suspended by the arms A1, A2, A3 and A4 upon the continuation of the sub-frame which carries the motor. This frame is attached at the forward end to a cross member of the main chassis and at the rear to the centrally located pressed-steel cross member. This is clearly shown in Fig. 8. The housing of the transmission is a one-piece aluminum casting, the gear-shafts being situated vertically one over the other. Referring to Fig. 6, it will be seen that the primary shaft S provided with

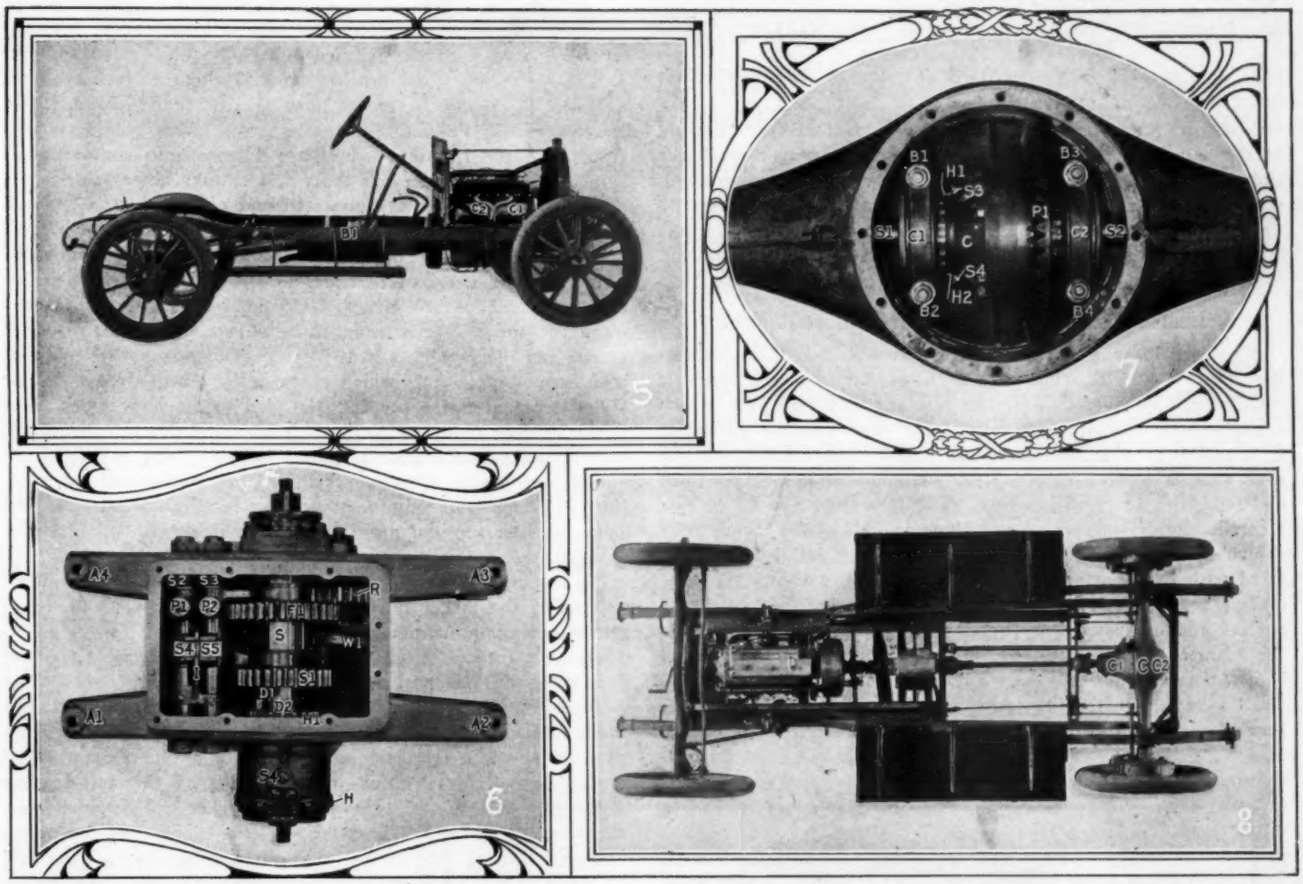


Fig. 5—Side view of the Warren "35" chassis, from which it can be seen that cleanliness has been aimed at

Fig. 6—Plan view of the transmission of the new Warren-Detroit "12-40" chassis, showing the long suspension arms

Fig. 7—Interior view of the rear axle of the 40-horsepower model with the front cover removed

Fig. 8—View of the 40-horsepower chassis from underneath, showing how the running boards are attached to the chassis

front end of the base chamber and a pulley is attached thereto. Fig. 1 shows the bracket B1, carrying at its upper extremity the fan and shaft, and in order to prevent the flat fan belt from slipping an eccentric adjustment is provided. By loosening, the nut B, which holds the clamp bracket tight, and rotating the enclosed boss an eccentric movement is transmitted to the fan shaft, thereby tightening the belt.

The spark plugs, of which there are eight, are located in the valve caps in the cylinder heads, and the wiring is conducted by means of the fiber tube L which is held in position by two clamp brackets fore and aft. Drain and level plugs situated in the lower half of the crankcase afford ready means of as-

integral splines carries the sliding pinions. The pinion H is in constant engagement with a secondary shaft and is fitted with dogs D2, and when the dogs D1 are caused to engage with D2 by sliding the rod S2 forward the direct drive is obtained. The pinion S1 when slid rearwards engages with the second speed gear-wheel of the secondary shaft, thus providing the second speed. When the sliding member S3 moves forward the pinion F1 is forced to engage with the secondary shaft gear-wheel by means of the lever arm engaging with the collar. The reverse pinion is shown at R. Slots S4 and S5 accommodate the drop arm, which is in direct communication with the change speed lever, and a slide I is interposed between these

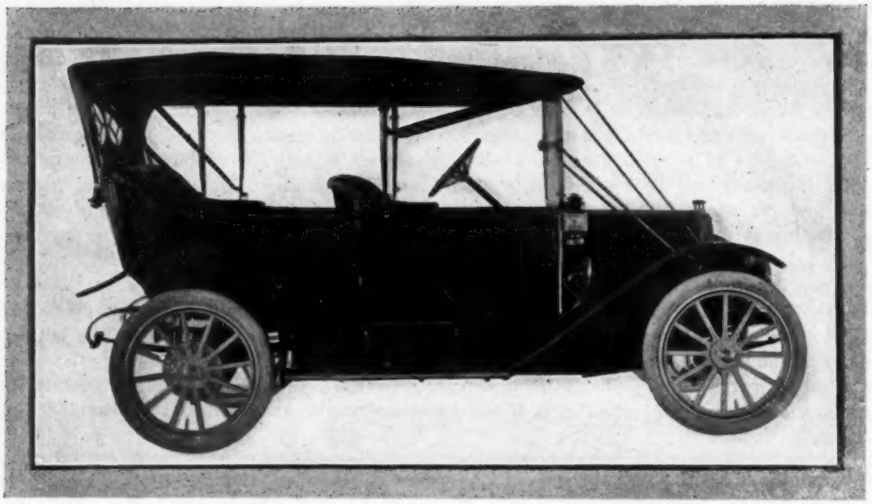


Fig. 9—Warren "12-40" fore-door touring car with flush-sided body

two in order to prevent the engagement of two sets of gears at the same time. To maintain the gears in proper mesh the slides S3 and S2 have V-notches cut in them and corresponding plungers housed in P1 and P2 and spring-urged, engage with the notches and thus hold the gears in position. Ball bearings are used throughout the gearbox for carrying the shafts and are mounted in cages held in position by the retainer S4.

Feature of Rear Axle Is Its Accessibility

A general idea of the rear axle can be obtained from inspecting Figs. 2 and 8. The extension of the gearbox shaft is squared and receives half of the forward universal joint which engages with the propeller shaft, the rear end of the latter terminating in a second universal joint. The housing of the rear axle is a drop-forged steel stamping fitted at the front and rear with removable covers. The forward cover C1 in Fig. 8 carries the driving pinion and shaft as well as the torque tube shown in Fig. 2. The axle proper is of the full-floating type, fitted with ball bearings throughout, and Fig. 7 shows the general arrangement of the interior. The main ball bearings supporting the extensions of the cage C are held in position by the clamps C1 and C2. In order to remove the differential bodily, these clamps may be removed by taking off the nuts B1, B2, B3 and B4 after the jackshafts have been withdrawn. A general view of the chassis is obtained by reference to Fig. 3, from which it will be seen that the forward suspension is taken care of by semi-elliptic springs 2 1-4 inches wide and 38 inches long, while the rear suspension is of the three-quarter elliptic type with the same width of the springs as obtains in front, but 48 inches long. The bolts carrying the springs are hardened and the spring eyes are bushed and fitted with greasers. The frame consists of pressed-steel side members united at three points by cross members, and as before stated a sub-frame is provided for the suspension of the motor and transmission. The front axle is an I-beam drop-forging and the steering knuckles and arms are drop-forged also, the wheels being fitted taper roller bearings. To prevent change-speed and brake levers from interfering with the body construction the bracket carrying these parts is mounted upon, instead of at the side of, the chassis. This eliminates unsightly brake levers outside of the frame and the running boards are formed into compartments 4 inches deep for carrying tools and similar accessories.

Two sets of brakes are provided and operate upon a 14-inch drum attached to the rear wheels, the service brake, operated by a pedal, being of the external contracting type, while the emergency brake expands inside the drums. The wheelbase of the "40" model is 116 inches while the tread is 56 inches as a standard; for Southern trade, however, a choice of 60 inches is given. Artillery wheels with 1 1-2-inch spokes are equipped with demountable rims which carry 34 by 4-inch tires.

Particular attention seems to be paid to the body work fitted to the Warren chassis, eliminating everything that is superfluous, and including in the purchase price, which is $1,700 for the 40-horsepower model, almost everything that is required for comfort. The general equipment includes headlights, side and tail lamps, mohair top and automatic wind shield with other minor refinements.

Passing to the new "35" model, the general details incorporated in the larger model apply to this type. The motor is cast in a similar manner and has a bore of 4 1-8 inches and a stroke of 4 1-2 inches. The valves in this motor are located on the right-hand side as may be seen in Fig. 5, which shows the valve covers C1 and C2. The difference in the price between this model and the 40-horsepower car is in a measure due to the size of the motor. The rear axle of this model is not of the full-floating type and the brakes are 12 inches in diameter. A general view of the transmission is shown in Fig. 4. It will be seen that this type has the housing divided in two halves with the shafts lying parallel to one another, horizontally to the frame, the shafts being carried on roller bearings. G6 is the master pinion with which G1 engages; G7 in mesh with G2 gives second speed, and the first speed is obtained by meshing G8 and G3. The reverse is obtained by engaging G8 with the intermediary pinion G5 which is in constant mesh with G4. The direct or third speed obtains when the gear G7 is slid along the shaft forward so that G6 enters in the interior of G7. The lay shaft is always running as the gears G6 and G1 are constantly in mesh.

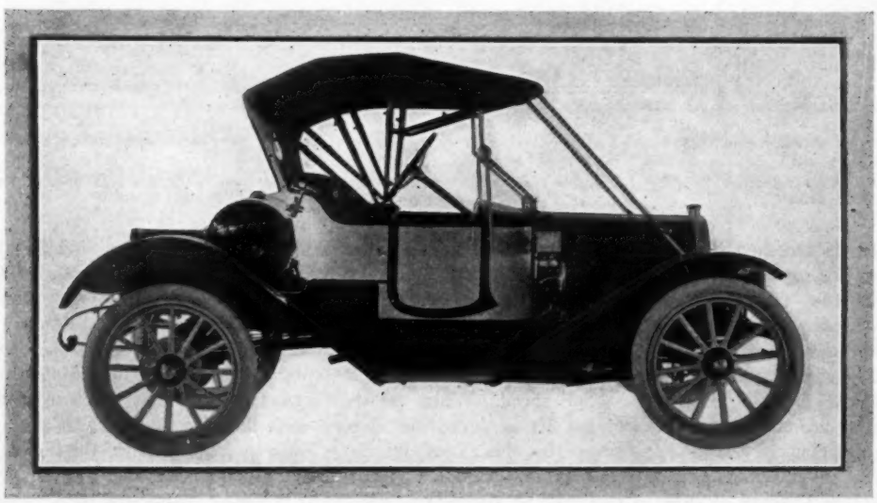


Fig. 10—Fore-door runabout fitted to a "35" Warren chassis, with top, wind shield, gasoline tank and trunk

Previous mention has been made of

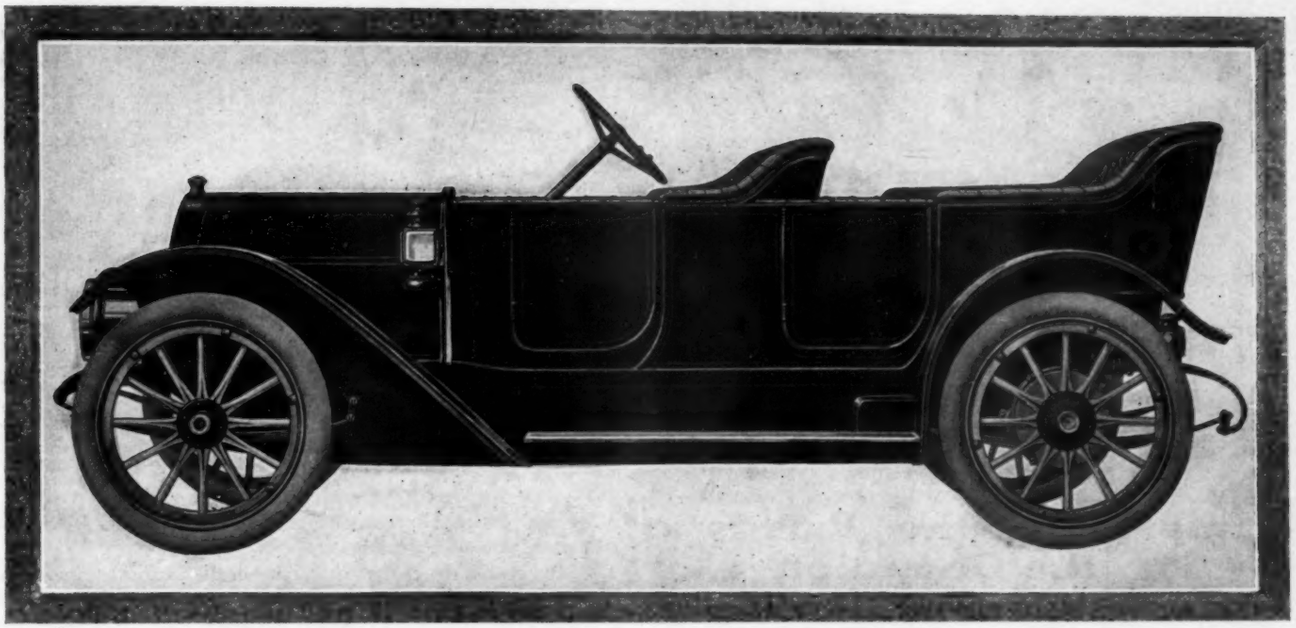


Fig. 11—Standard fore-door touring body fitted to Warren "35" chassis with restrained body line giving a straight-line effect

the Warren "30" in this article, and it only remains to state that the car is in every mechanical essential the same as last year's model. The motor, which has a bore of 4 inches and a stroke of 4 1-2 inches, has remained unchanged and the same applies to the transmission and axles. Additional equipment has been included in the price of this year's car, however.

Useless to Worry Over Valve Stem Lubrication

After the engine has been running for a time a film of oil will be found to have collected on the valve stem which amply lubricates the same, and, if a little pulverized graphite has been placed upon them in assembling, no trouble will be experienced.

IT is quite practicable for valves to work without any attention, so far as their lubrication is concerned, as after the engine has been running for a while a slight film of oil, which has found its way past the cylinder, will have collected upon the stems. If the cylinders are over-lubricated the oil is apt to collect on the stems, gumming them and causing them to stick to their seats.

Where there is any tendency to stick it would be well to allow some kerosene to pass through them. This is a great cure for stickiness on the part of the valves and will be found to relieve them at once. The greatest evil which can occur from an excessive amount of oil reaching the valves is that of carbon deposit. This would, if it held the valve open, cause a loss of compression and hence of power.

Care on Country Roads a Necessity

A lack of foresight is a dangerous thing on a country road where a sudden turn may bring the unwary automobilist face to face with a machine speeding in the opposite direction, with a driver who is also unprepared for the contingency. Ditching a machine is at best a dangerous and unsatisfactory entertainment.

UNDERESTIMATING the other fellow, while as a rule a rather unsafe principle, becomes at times the very essence of safety. In touring about the country there are various contingencies which arise. Whether these contingencies can be classed (after the trip is over) under the heading of incidents or accidents depend upon such a variety of things that it would be impossible to start to analyze them. The largest factor in keeping them under the former head is that of foresight.

There are any number of short "S" turns which are so completely banked off by intervening trees that two cars approaching from opposite directions would hardly have time to veer off to the edge of the very narrow road unless the warning horn was sounded before the turn was negotiated. There are other numerous types of curves and other road conditions which should enforce upon the careful driver's mind the necessity of keeping his attention fixed on the road if he hopes to offset the approaching driver's mistakes.

Buy Suitable Spark Plugs

Spark plugs as well as any other kind of plug are made in different lengths. It is possible to buy them either too long or too short, as it has been found by experience that to have either one of these two conditions represents a fault.

ONE of the great reasons why motorists do not get the best possible results from a very good engine is the fact that the spark plugs may be unsuited for the spark-plug hole by either being too long or too short. If the spark plug is too short the spark is concealed around a bend or behind a wall of metal which interposes itself between the spark aperture and the combustion space. When the plug is too long, the end is apt to glow after a prolonged contact with the hot gases. The spark plug in this case projects so far into the cylinder that it does not get the benefit of the waterjacket space which only can effect the upper part of the plug, leaving the lower extremity subjected to the extreme temperatures of combustion.

The glowing spark-plug points will ignite the gases long before the proper time and will cause them to rapidly burn away or fuse together.

The ideal condition is obtained when the end of the spark plug is just flush with the bottom of the spark-plug aperture in which case the plug is kept cool and the spark occurs in the correct place.

ALTERING VALVE LEAD—The lead of a valve can be altered at any time independently to the cam, by setting the teeth of the timing gears differently.

International road near St. John's, P. Q., before scraping

Road scrapers working on international road near Lacolle

Showing a fine stretch of road near Lacolle after scraping

Improving the Roads of the Dominion

The Automobile Club of Canada is devoting much time and money to the improvement and marking of the roads. Efforts are afoot to improve and properly signboard the international road between Montreal and Rouse's Point, N. Y.

IN considering the subject of roads in Quebec Province, Canada, it may be said that Government intends to expend the sum of $250,000 during the present year for improvements and the making of new highways. One must not lose sight of the fact that the Automobile Club of Canada is eminently visible in every phase of enterprise in connection with the construction of these highways. As a single instance, it is due to the club's persistent work that the authorities of Quebec Province were induced in the year 1910 to increase the State subsidy for the upkeep of roads from the original 50 per cent. basis to 75 per cent.

The revenue derived from all fees collected and penalties imposed within Quebec Province under the section known as "Application of Revenue," is transmitted to the Department of Agriculture, to be applied to the improvement of Provincial highways. Fees and fines have amounted to the sum of $50,000 during the fiscal year just ended.

The members of the Automobile Club of Canada have at their own expense already succeeded in establishing permanent guide signs and caution signs in several sections of the Province, and especially along the international road which extends a distance of 51 miles, covering the course between Montreal, Canada, and Rouse's Point, New York. At the present time they are concentrating their efforts to induce the Quebec Provincial Government to build a State road from Quebec city (the route taking in St. John), to Rouse's Point, a stretch of 230 miles. The line cuts through many localities of signal historic interest. During the year 1910 the club brought about the building of 15 miles of first-class roadway along the South shore of Montreal Island.

Registration figures show that there are 4,000 automobiles in commission within the Province of Quebec. Of this number 1,400, or more than one-third of the total, are maintained in Montreal. Quebec Province has a multitude of drawbacks not found in Ontario; for instance, one of the most serious is the absolute refusal on the part of the Provincial authorities to permit automobilists even to pass through the territory in many sections, while no owner residing within the forbidden lands may own a motor car with the view to driving it there. One of the most hostile sections is Prince Edward Island.

At the same time, it must be admitted that the motorists residing within Quebec Province are doing all in their power to induce the authorities to pursue modern methods of road building and put the Provincial highways in proper shape to accommodate automobile traffic.

Montreal is the center of activity in the matter of automobiles, so far as their propagation as vehicles of travel is concerned. There is no company in Quebec Province which is devoted to the manufacture of motor cars, not even of bodies or parts. The man who sets his mind upon possessing an automobile, buys one that is made either in England, France or the United States—with now and then an exception in the way of an Italian-made machine. But the large majority of the 4,000 motor cars in use in Quebec Province were made in the United States. There is a duty of 35 per cent. on automobiles imported into the Dominion.

If the owner of an American-made motor car were asked why he chose that particular type of machine he would invariably answer: "Because of our closeness to the United States, and the readiness with which we can get parts, in case of an emergency. It means only four-and-twenty hours delay at the utmost; while if we were to order parts by cable from England, France or Italy it would necessitate a delay of at least a fortnight, if not longer."

There is no chauffeurs' club within the Province. The average wage paid to the driver is $15 per week. Every person other than a chauffeur who drives a motor car pays a license of $5 per year to operate his machine. Besides he is required to pay an additional registration fee annually, based on the following graduation: Motor cars up to 25 horsepower are each taxed $5; from 25 to 35 horsepower, $10; from 35 to 50 horsepower, $15, and $20 for every automobile above 50 horsepower.

Quebec Province maintains reciprocal touring relations with such States within the Federal Government as permit Canadians to cross their borders bearing a Dominion license.

The laws governing the operation of motor cars in Quebec Province are quite strict. A fine of $10 is imposed, or sentence to imprisonment for not less than six months is inflicted (within discretion of the magistrate) upon "the person who interferes or tampers" with a vehicle without the permission of the owner thereof.

The law regulates the speed limit to nine miles per hour in towns and cities and to fifteen miles per hour in the open country.

The streets of Montreal, which city is the center of automobile activity in the Province, are so narrow that they constitute a continuous source of annoyance to drivers of every sort of vehicle, motor cars in particular. Fifty per cent. of the paving material used in Montreal is asphalt. The putting down of wooden blocks has been discontinued entirely. The cost of laying asphalt, including a 6-inch concrete base and a "cushion coat" of asphalt, for the fiscal year just ended was $2.11 per square yard. There are two municipal asphalt plants, devoted chiefly to repair work.

France to Change Its Rule of the Road

In July of next year the direction of traffic on the highways of France will undergo a transformation, the present keep-to-the-right rule being superseded by a law similar to that which now obtains in the British Empire, where all traffic keeps to the left side of the road.

FRANCE has flopped over from the right side of the road to the left side, and at the beginning of July, 1912, "the rule of the road" in France will be reversed, and traffic, instead of keeping to the right, as in the past and at present, will be compelled by the law to drive on the left-hand side of the road after the manner of the custom which obtains in Great Britain—even including Ireland. There was a long series of meetings and sittings of the Commission empowered to take the matter under advisement. It is not for the purpose of imitating the British system that this change has been brought about. The movement is due to two causes: First, the enormous increase in the volume of motor car traffic; and, second, the influence which British-made automobiles have had on the designs of machines manufactured in France.

It was sometimes the practice in the early days of the Continental models for designers to have the steering apparatus on the left, thus compelling the driver to sit on the off-side, this having been the best position for managing his machine in the midst of traffic. While this was a point of vantage in Continental Europe, where traffic was directed to the right, the reverse was the fact in Great Britain. And as the English-made cars increased in number, France woke up to the fact that it behooved her to fall into line. Consequently, the French set out to build their automobiles for use in Europe on the British model, so far as the steering wheel is concerned, and having gone in for motor cars after this pattern, they have found it absolutely necessary to alter the rule of the road.

Some Problems of Live Rear Axles

How Selling Points Interfere with Success

It is suggested here that the salesman, who no doubt has his foot upon the cash-box, too often dominates the construction situation, demanding talking points at the expense of quality of the product, and in making his demand the salesman also makes it impossible for the manufacturing department to properly comply with the same because he fixes the price too low to pay for the work that he wants.

MANUFACTURING automobiles, speaking broadly, is attended by many serious difficulties that do not obtain in the other arts from the manufacturing point of view, and in looking into these problems it takes but a little investigation to disclose the inharmonious relations that are at the seat of the most formidable of these troubles. The sales end of the automobile business dominates the situation to a far greater extent than might be generally understood, and the engineers, as well as the constructors in the shops, are too often engaged in the business of giving to salesmen the greatest number of "talking points" that can be brought under one "canvas," not at a price which is made up by determining the cost and adding a profit, but at a price that the salesman fixes at the time he makes his demand.

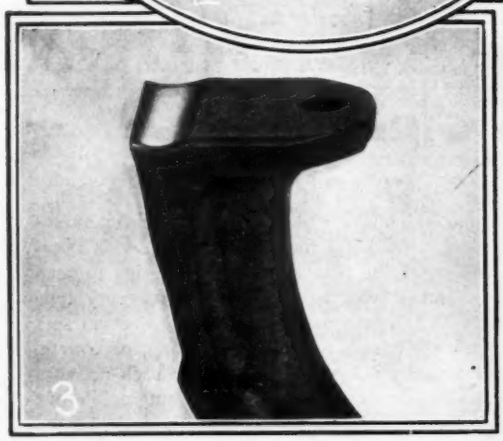
There is no possible chance of realizing a good automobile out of a salesman's demand, although he, in his diplomatic way, calls his every demand a mere recommendation. A good salesman is rarely ever capable of appreciating the purely mechanical necessities; his scientific training is confined absolutely to the science of wringing money out of the pocket of a "prospective," and his honesty of purpose, however good it may be, is without value from any other angle of view than his own.

Fortunately, the maker of the better type of automobile employs engineers and other "talent," which, under proper direction, produce the type of car that constitutes a selling point in a broad sense, leaving it to the salesman to enlarge upon the details.

Unfortunately, and let it be said, for the maker as well as for the prospective, the car that is composed of a miscellaneous assortment of selling points aggregated at the instance of the sales department is so lacking in harmony of the relations of these selling points that it would be unnecessary to annoy the engineer of the company, which is all that could happen were he to be employed for the purpose of producing this product.

Of course, it is claimed for every plant that it has an engineering department, but too often some high official usurps this function, and it goes without saying that a man who is trying to keep the ends of his investment from getting away is the very type of man who is likely to fall into the trap that the salesman sets and this type of engineer agrees to, he not knowing, of course, that a real engineer would put his taboo upon any such activity, and that the poor devils who are told to make an automobile out of selling points are merely working for so much a week, knowing perfectly well that the automobile so made will be a thorn in the side of the purchaser, and a stumbling block for the company that builds it to stub its company toe upon.

Fig. 1—Showing how the jackshaft may be tinned to increase its diameter so as to prevent leakage of lubricant



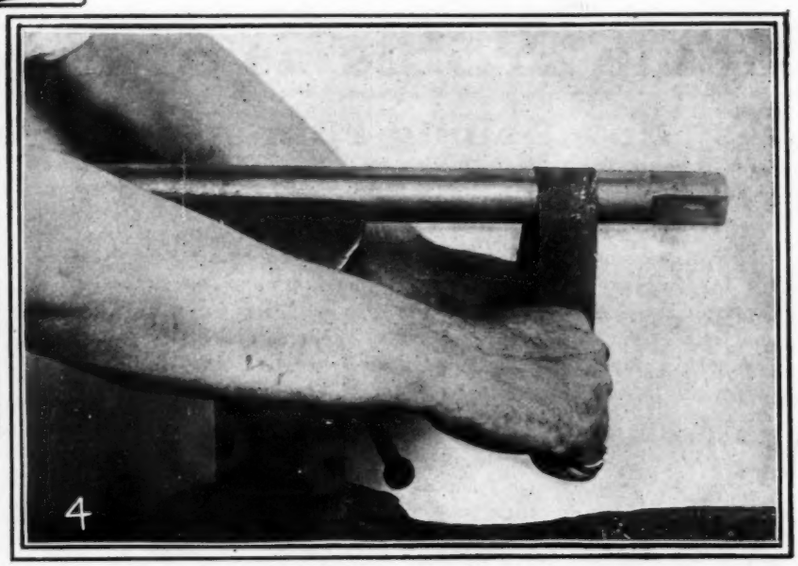


Fig. 2—Showing a worn brakeshoe after having been repaired by the oxy-acetylene process

Fig. 3—Depicting the worn shoe before being fixed up

Fig. 4—Cleaning a shaft with emery cloth preparatory to tinning, also useful for cleaning up a burr

There is no part of the car's mechanism that offers more fruitful thought for the competent designer than the live rear axle and its component parts. The full-floating type of axle with a pressed-steel housing, if properly made, is comparatively light when compared with a webbed casting and the independent assembly of the jackshafts permits of more careful adjustment of the differential proper. The live rear axle is as much in need of lubrication as the motor, yet it is surprising how this one item alone has been neglected or perhaps side-stepped.

A conversation that recently took place in an automobile factory reveals the state of affairs in a nutshell. After a five-hour road test the car was rolled to the running shed and the tester's sheet showed that it was ready for delivery to the customer in perfect working order, and when questioned by the chief engineer the tester stated that it was the best car that had been turned out so far. That may have been the case, but after the test the rear wheels and tires were bespattered with nearly as much oil as it would require to fill the rear axle casing. When the tester was asked if he thought that it was proper to pass a car in that condition his reply was: "Why, they're all like that, and you can't stop it."

It is true that the tester could not be blamed for the construction of the axle, but, nevertheless, it was his duty to report that each and every car that he tested had this defect. Unless the engineering force is apprised of such shortcomings, they are not in a position to rectify the mistake in the current series, and it is quite possible that mistakes are perpetuated.

Mention has previously been made of building cars at a price fixed by the selling department, leaving the designer no other choice than to evolve a car that will not cost more than a given amount. This method will eliminate refinements and will cause the purchasing department to be guided more by economy than intrinsic value. Manufacturers who do not manufacture the entire car themselves have a good deal to contend with, as they cannot be personally responsible for the goods that are turned out by parts makers. There is just as much necessity for the maker to have a representative, either traveling or resident, who looks after his interests at the parts factories, to assist in the calibration and see that it is properly carried out, as there is to maintain such a department in the factory proper.

Initial price cutting recoils on the maker's head, as will be conceded by any right-minded person, since it will be necessary for the purchaser to remedy the shortcomings by replacing such new parts as show early wear and resorting to artifices in the endeavor to overcome constructional blunders. Matters being in this state, it is proposed to show by the use of illustrations how some of the inherent defects of live rear axles may be overcome.

The oil-leaking propensities of some rear axles may be remedied by tinning or brazing the shaft, thereby reducing the aperture through which the oil finds its way. This may be seen by reference to Fig. 1, in which a jackshaft is shown in a vise, and the operator in the action of tinning the shaft. It is preferable to put the shaft in a lathe after the tinning operation has been completed, but in cases where it is unhandy emery cloth in the manner shown in Fig. 4 will answer nearly as well. The operation shows the shaft being cleaned up prior to the tinning.

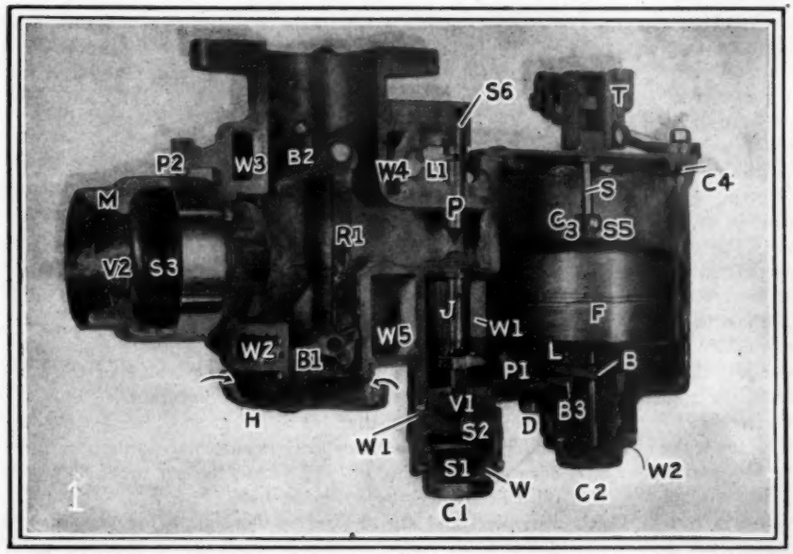
It is most essential that a car should be fitted with a good set of brakes, with adjustments that can be speedily effected. Brakeshoes of the type shown in Fig. 3, the surface of which was originally flat, but which has worn owing to the softness of the metal, are a cheap form and are a constant source of annoyance to the user. With the advent of the oxy-acetylene welding process it is no longer necessary to purchase a whole new shoe, as it can be seen from the Fig. 2 that the surface that contacts with the operating tongue is virtually as good as it was when turned out by the makers.

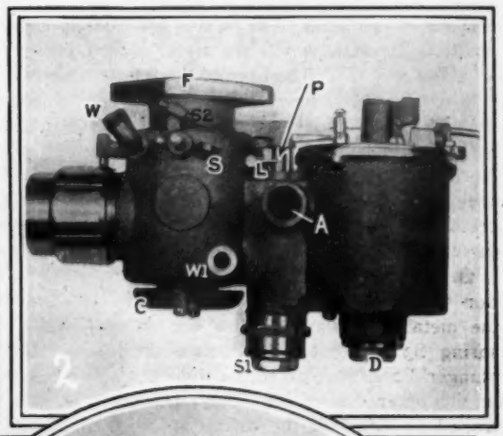
One has to be somewhat of a mechanic to improve what someone else has left undone. After the time that the unfortunate owner has changed this and altered that, he might have just as well paid a little more money in the first place, thereby saving himself a good deal of annoyance.

How to Study the Carbureter

Discussing the Details of Operation

It cannot be expected that a carbureter will work well every day all the year round under precisely the same adjustments when the atmospheric conditions vary in such wide degree. Every driver will have noticed how a car pulls better on some days than on others and how, when the car is new, the motor responds at once to a touch of the throttle, whereas when the motor has limbered up there is something still to be desired. In discussing these points the Rayfield is used as an illustration.





THE vagaries in the performance of the average carbureter are due to the fact that the adjustment of the gasoline to the air is better on some days than on others. This may not altogether be clear at first view, but when one considers the heat of a Summer's day and the intense cold of the Winter or the humidity that prevails on some days as compared to the crispness of others it must be apparent that gasoline will not always combine with the air in the same manner, and its differing volatility under various conditions will be understood.

In order to cope with the difficulties put before the motorist in his endeavor to obtain the maximum results under any condition, be they along the line of efficiency of the motor or minimum gasoline consumption, the Rayfield carbureter offers an example worthy of notice. The general principle of the carbureter follows along the broad lines of carbureter manufacture. Refinements have been introduced whereby through the turning of a milled screw or the pressing of a knob on the dash an alteration of the ratio of gasoline to air can be obtained.

It is proposed to show from the photograph of a carbureter that has been cut in two, as seen in Fig. 1, the relation of the various parts of the mechanism, and later from the two exterior views how these are operated and controlled. On the right-hand side of the illustration is the float chamber containing the float F, which is attached to a spindle S by means of a split clamp C3 and locked in position by means of a screw S5. If it is found necessary at any time to alter the gasoline level such an operation can be carried out in a very short space of time by removing the cover C4 which is held in place by three screws. The lower part of the float chamber is fitted with a plug which is removable if it is found necessary to drain the float chamber from time to time from any impurities, such as water, that may find their way inside. The lower end of the spindle S is formed in the shape of a ball which engages with a hole in the lever arm L, which is caused to rock on the pin P1 so that when the gasoline enters and fills the float chamber the needle valve V1 will drop and cover the orifice S2 through which the gasoline enters the carbureter in the first place. The lever and its support are carried on a bracket B3 held in place in the base of the float chamber by a screw D. To make the float chamber gasoline-tight there is a washer W2 interposed between the base and the cap C2.

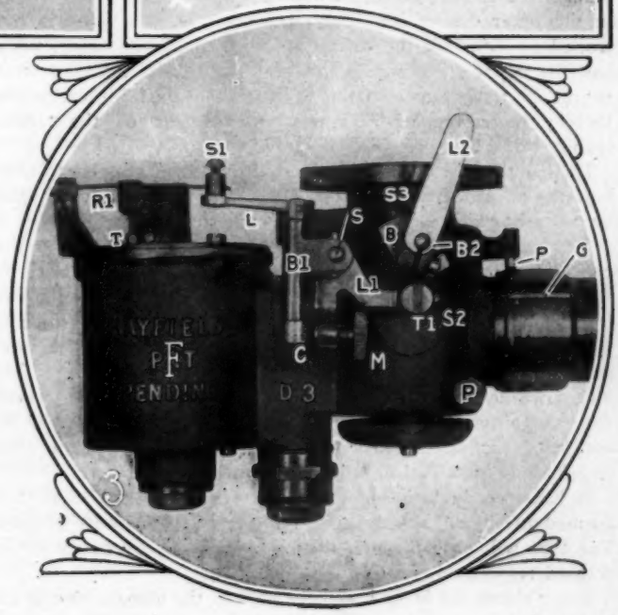


Fig. 1—View of a Rayfield carbureter cut in half to show the co-relation of the various component parts

Fig. 2—Exterior view showing air intakes and general aspect

Fig. 3—Regulating device by which the flow of gasoline is varied

Below the seating S2 into which the needle valve fits there is a cap attached in a similar manner as C2 with a washer that contains a fine mesh wire gauze S1 and the connection for the gasoline feed screws into the base of C1. The needle valve seating is also removable, as the whole part S2 can be unscrewed from the main body. It will have been noticed that there are no weights in the float chamber, but this is carried in one piece with the needle valve V1, as seen at W1. The tip of the valve is made of steel and less susceptible to wear than brass or phosphor bronze. The weight is hollow and crossed drilled to allow the gasoline to pass from the float chamber to the spray nozzle or jet J. The jet is screwed into the part of the casting forming part of the mixing chamber and can be removed after the seating S2 has been removed, as it has a slot in the base for a screwdriver to get a purchase.

The quantity of the gasoline that is allowed to pass through the jet is controlled by an inverted plunger P with a conical end and the height of which is regulated by the small lever L1. One of the features of the Rayfield carbureter lies in the method of controlling this plunger. A spring S6 is placed in the recess above in order to insure that the plunger will return after being lifted by the lever. Without dealing at the moment with the operation of the plunger it might be mentioned that the higher the plunger is lifted the more gasoline will be allowed to pass into the mixing chamber.

Opposite the orifice of the jet there is provided a constant air intake, but it is not shown in the illustration; it can be seen, however, at A in Fig. 2. The mixing chamber is water-jacketed, the conduits through which the water passes being shown at W2, W3, W4 and W5. The base of the mixing chamber is open, being covered partially, however, by the cap H, air passing in as indicated by the arrows. Two butterfly valves situated in the mixing chamber control the main body of mixture at B2 that passes to the intake manifold, and the smaller butterfly B1 controlling the supplementary air which is required as the gasoline is increased by the automatic lifting of the plunger regulated by the throttle lever. On the left-hand side of the mixing chamber there is an automatic air valve that works in accordance with the suction of the motor. The valve is shown at V2 with a section of the metal cut away to show the nature of the valve and the spring S3 that holds it on its seat at slow speeds. A spring plunger P2 is situated above the valve and registers in slots cut in the outer casing M. The adjustment of the valve is controlled by screwing the casing M one way or the other, which has the effect of bringing the seat on which the valve rests nearer or farther away from the main body of the carbureter, thereby increasing or decreasing the tension of the tension spring.

Having thus dealt with the internal organs, it remains to show how the adjustments are effected and how the relation of gasoline to air is altered to suit certain conditions.

Just what effect the extra air valve has over the carburetion can be summed up in a few words. In order to equalize the flow of gasoline and air it must be remembered that as the suction of the motor increases with a corresponding increase of speed the capillary attraction on the jet is increased and more gasoline is caused to spray through the orifice of the jet. The air, however, does not increase in the same proportion, therefore the automatic air valve is employed so that with the increase of suction the spring will be overcome and allow additional air to pass in and mingle with the gasoline.

It has already been shown how the plunger P in Fig. 1 is formed and how if this is raised or lowered the quantity of gasoline that will pass through the orifice will be increased or decreased respectively.

Fig. 2 shows the lever L and the part of the plunger that is exterior of the carbureter. The lever L is caused to move up and down carrying the plunger with it. The constant air intake is shown at A and the water connections for heating the mixing chamber to assist evaporation and prevent condensation are shown at W and W1.

The adjustments are shown in Fig. 3. The small shaft S is connected to the lever L in Fig. 2 and therefore to cause the plunger to rise or drop is a matter of causing the shaft S to rotate. The tube C extends to the dash and terminates in a bracket with a push knob. This knob is attached to the extension of the wire R1, which in turn is attached to the lever L by the set screw S1. If the knob on the dash is pushed in or pulled out the lever arm will be moved to and fro, and being as it is connected by a shaft inside the bracket B1 to the cam C, and rotation will cause the cam to ride on the set screw M and so turn the shaft S which will move the plunger over the jet.

This offers a means of increasing the amount of gasoline for starting purposes and fixes the slow-speed setting. The limit of travel in this direction is regulated by the set screw S2 in Fig. 2. The lever L1 in Fig. 3 carries at one end a slot with a tongue held in place by the screw S2. The tongue T1 is in contact with the curved block B and as the throttle lever L2 is moved the tongue will ride on the block B and cause the lever L1 to move and so turn the shaft S, thereby raising the plunger. The butterfly valve shaft is attached to the block B2 and the adjustment of the lever L1 in relation to the throttle is regulated by the screw S3, which causes the block B to press down on the tongue or recede from it. The plug is connected with the water circuit and should be unscrewed to let the water out of the jacket whenever it is found desirable to let the water out of the motor and radiator in the case of frost, otherwise the water may expand and burst the carbureter casting.

When Judgment Whispers Don't

DON'T imagine that taking care of an automobile is a matter less serious than the work of nursing a child; trouble will come if either is neglected.

DON'T believe that the noise of a motor is of lesser significance to the well-being of the car than the whine of the baby is an indication of an ill-balanced digestion.

DON'T overlook the fact that oil is great stuff in putting deranged organisms and mechanisms into order; a good dose of lubricating oil will benefit the car much as castor oil will silence the suffering baby.

DON'T misunderstand the desire of the motor for gasoline; it delivers its useful work in just the proportion as it drinks up the stuff.

DON'T entertain the idea that a good ignition system is less important than a sufficient supply of gas; the stimulant must be burned to make the car move.

DON'T monkey with the ignition system of your car; it ought to be below your dignity to play with the sundries.

DON'T be impressed with the self-conscious air of the chauffeur adjusting the carbureter; he may be unable to restore the good adjustment which he spoils.

DON'T underestimate the value of the man who goes about his work on the automobile without trying to show off and to put up a bluff.

DON'T tell your friends about the virtues of your chauffeur and then object when the fellow demands a raise; someone might have handed him the tip.

DON'T frown when you pay for the maintenance of your automobile; an automobile, if rightly applied, more than pays for the cost of buying and keeping it.

DON'T think that the only way in which an automobile pays is in cash coin; pure atmospheric air, moving at a speed of 20 miles or so, is more useful than gold and, therefore, it has to be paid for.

DON'T forget that the refreshment brought about by a 20-mile ride enjoyed every evening will stretch your lifetime to three-score and ten years.

DON'T pour gasoline through a dirty funnel. If it has been standing for a while, clean it out.

Peeps Thro' Goggles at Distant Lands

What the Foreigners Are Doing in Automobiling

Siam's King's official physician is provided with an automobile—British discussing visible sign-posts—London's Fire Brigade being rapidly motorized—Building cars to measure—Imports of gasoline into the United Kingdom—Coronation Durbar in Delhi brings demand for automobiles.

FAR-OFF, benighted Siam is stepping out into the spotlight, so far as the adoption of automobiles for public service is concerned. The latest example of modern enterprise along these lines is the purchase of a 10-horsepower motor car for use by the Medical Officer of the Bangkok, Siam, Board of Health, Dr. Highet, who is also physician to the King of Siam. He will employ the automobile extensively about the country, since his professional duties are calling for a wide circle of work.

In dealing with the scheme for providing a unification of the erection and maintenance of warning signs in England for the benefit of automobilists, the British Roads Improvement Association has considered the question of the visibility of the posts carrying the signs at night. The scheme involves a series of five sign posts, each differing in color, and so painted as to be seen after nightfall.

London's automobile Fire Brigade has met the expectations of even the most sanguine promoters of the new plan. The force of this statement will appear when it is said that London has decided to discard horse-drawn fire engines and horse carts altogether. The Finance Committee of the London County Council having the preparatory matters in hand, estimate the cost of the complete conversion of the Fire Brigade equipment—more than 210 appliances—at $1,050,000. The Treasury will be asked to sanction a period of ten years for the repayment of so much of the expenditure as would be considered equal to the net addition to the capital value of the Fire Brigade's plant.

Certain English automobilists are arguing with the aim to bring about car-building to accommodate individual requirements, after the manner that one would order his tailor to make him a suit of clothes. Special attention is called to the individual requirements in the distance between the seat and the steering-wheel. One motorist who confesses to be "of generous proportions" bewails the fact that not he alone, but many other "motorists of huge anatomical proportions" frequently are forced to subject themselves to painful contortions in order to get safely ensconced behind the wheel; while small men are seen steering with the wheel in an awkward position, much too high for them. The complainants seek to have all of these errors of construction changed.

The United Kingdom imported 30,000,000 gallons of gasoline during the first six months of the present year, ending the 30th of June. Of this amount, the bulk came from the North American oil fields. Only 10,000,000 gallons was sent from the Far East, the quantity falling below the supply shipped from that section of the world into England during 1909 and 1910—years in which the American supply to England was very low. There were 3,000,000 gallons of Far East imports into Holland, which amount was reshipped to England, during the first six months of this year. This product came from the Shell Royal Dutch fields. Russia gained considerably over previous years, her supply of Grosny gasoline into England amounting to 5,000,000 gallons.

The Far East is raising a loud voice in the call for the automobile. The Indian Government is manifesting a spirited interest in this respect, having just ordered thirty English-made, 15-horsepower, four-cylinder motor cars for official use during the forthcoming Coronation Durbar to be held in Delhi on the occasion of the visit of their Majesties, King George V and Queen Mary.

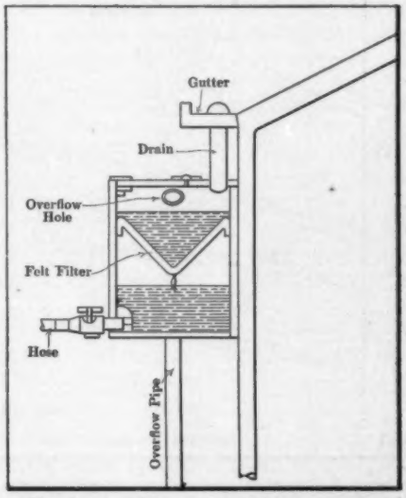
Soft Water for Radiators

The thoughtful garage owner and motorist can have the very best water for the radiator by the installation of a device for catching the rain water from the roof of the garage and keeping it bottled up so that it is handy at any time. The water can be used not only for the radiator, but also in washing the finely finished parts of the body.

THE virtues of soft water for the automobile radiator are well known and recognized by all those who have any knowledge whatever of the preservation of metallic surfaces which are in contact with water. Ordinary city hydrant water always contains a number of impurities which are extremely injurious to metal even if they are present in very small quantities, the greatest amount of damage, perhaps, being caused by the carbonic acid which is present to a greater or less extent in our city water. This acid is very active when heated.

The hardness of water is determined by the amount of lime or magnesia it contains which have the ability to decompose soap. This faculty provides a means of measuring the hardness of the water and by chemical relations involved determines the purity. Rain water lacks to a great degree the corroding elements and hence is valuable for use in automobile radiators. The accompanying wax illustration shows a method whereby the rain water may be caught from the roof of the garage, filtered and kept for use at any time.

If the tank is made large enough the water may be used in washing the more finely finished parts of the body, thereby preserving the delicate finish for a much longer time than if the ordinary hydrant water were used. The water flows from the roof into the upper part of the filter-tank and strains to the lower part, passing through a piece of felt which effectually filters the water. The felt may be replaced by a fine wire-gauze strainer if desired. In case of a superabundance of water, the excess will drain to the ground by means of the overflow pipe and hole in the upper part of the tank. This should be led to a spot where it will not collect in a pool, and soak into the walls.



Showing method of installing rain-water tank so as to take the water from the garage roof.

The Heat Losses of Cooling

Enforced Radiation a Necessary Evil in Any Engine

Greatest among the sources of loss of thermal efficiency stands the cooling process, which, although necessary, can, by an intelligent manipulation born of a knowledge of the basic principles involved, be made to perform its work in the most economical manner possible.

ALONG with all the other ideas of obtaining "something for nothing" in a mechanical way that of producing an engine without some process of cooling, with its consequent loss of thermal potency, has long passed away. The flow of heat through a body, such, for instance, as the walls of the cylinder of a motor, is a function of the time of the process, the area of the surface involved, the difference in temperature of the opposite surfaces of the body, the conductivity and the thickness. The thickness, in so far as the purpose of this article is concerned, may be neglected. A knowledge of these facts is of use if taken with the other phenomena of the gas engine cycle and used to secure the utmost efficiency from the engine without sacrificing certain necessary features in construction.

Since the longer the cooling process is carried on for each charge brought into the cylinder, the more heat (which has been abstracted from that charge) will be thrown away by the radiator, it is evident that the best conditions obtain when the exploding charge is submitted to the cooling influence of the cylinder walls for the shortest length of time. This means that more charges must be burned per minute in order to have each charge acted upon for a less amount of time and also, since, as we have stated, the radiation is a function of the time, to allow a less amount of heat to pass through the walls. Evidently the more explosions per minute the higher the piston speed, which indicates that the greater the number of revolutions per minute at which the motor is run the lesser the amount of heat lost through the cooling medium from a per-horsepower standpoint.

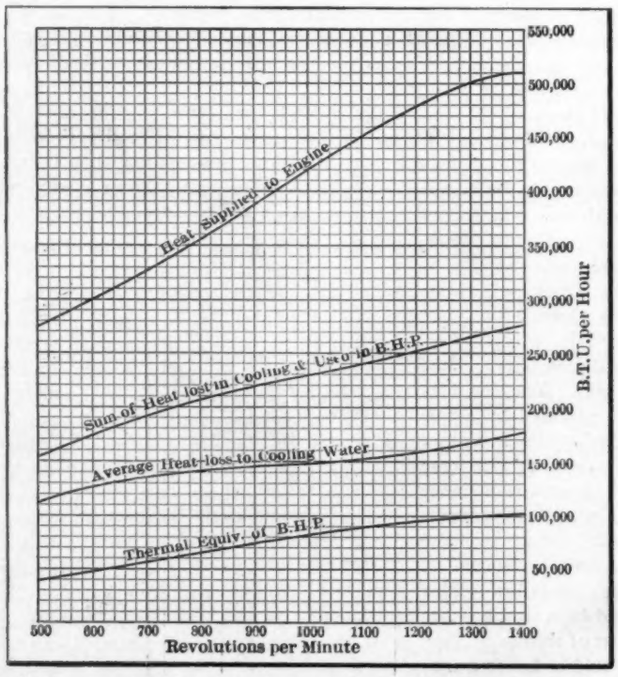


Fig. 1—Showing the amount of heat lost in the cooling fluid as compared with that given up in useful work. (B. H. P.) The distance between the two upper curves gives the heat lost through other causes

The area of the metal exposed to the burning charge is directly dependent upon the bore and stroke, with the exception of the irregularities in the shape of the combustion space due to ignition system openings and valves. Hence the factor of area is determined very closely in the primary design of the motor. It serves to illustrate, however, that there is a greater loss, per horsepower, of thermal efficiency due to cooling in a large engine cylinder than in the smaller high-speed type. Combining the two functions of exposure, time and area, it will be seen that the least amount of heat lost is under the condition of having the least area exposed per unit of time per explosion. This again brings in the condition of high speeds for the reduction of the loss of thermal efficiency due to cooling.

In order to cut down the heat extracted by the cooling fluid from the burning gases the difference in temperature between the inner and outer faces of the cylinder walls must be as small as possible. Since the heat of combustion is fixed and definite, the nearness of the temperature of the cooling water side of the cylinder wall to that of the combustion side will be determined by the heat of the cooling water, the hotter this is the less the difference in temperature between the two faces. The cooling water must therefore be allowed to run as hot as practical limits will permit. The heat of the cooling water is regulated by either the amount of water passing through the jackets in a given time or by the rapidity of the circulation. Good practice on level ground is to have the cooling water at about 180 degrees Fahrenheit; this leaves a margin before reaching the boiling point of 32 degrees, so that in climbing a long steep hill where the motor will heat up owing to the open throttle and late spark there will not be such a tendency to overheat the water.

The remaining factor of conductivity is negligible in this discussion, as it is constant for all the standard radiators in use and may be regarded as a fixed quantity.

The set of curves given in Fig. 1 will illustrate graphically the amount of heat lost in cooling in the average motor of good design running under mean conditions. The four curves show the thermal equivalent of the brake horsepower, the average heat lost per hour through the medium of the cooling water, the sum of the heat lost in cooling and used in producing the brake horsepower and the total heat supplied to the engine with the fuel. Since the third-mentioned curve is the sum of the heat lost in the water and that used in brake or useful horsepower, the distance between this and the top curve of heat supplied with the fuel will represent the heat losses by other means than by the cooling water, that is through the exhaust and by friction. An examination of this set of curves will show that the heat lost to the cooling water is more than double that used in producing useful work at the lower number of revolutions, while the ratio grows less as the revolutions become higher and the cooling water is exposed to the heat of each explosion for a less amount of time.

Although the cooling fluid carries off much of the heat in the cylinder walls it must not be supposed that the walls are ever of the same temperature as the cooling fluid even at the coolest part of the cycle, for the remaining dead gases after the exhaust are of very high temperature. On the suction stroke this temperature is reduced by the incoming mixture, but even then the walls are hot enough to contribute toward heating the new charge. It

would be impossible for the walls to give up all the heat absorbed by them during each explosion stroke in so short a time as that which marks the interval between these operations. After the engine has been running a while at a regular speed a rythmic wave motion of heat rises and falls in the cylinder and cylinder walls. The difference in temperature between the cooling water and the metal of the cylinder walls must, even in the most favorable conditions, be 55 degrees and in very large cylinders even more. Referring to the curves in Fig. 2, the rapidity of rise of the curve of B. t. u. in cooling water referred to piston displacement will be noticed. This is mainly due to the greater temperature difference between the water and the cylinder walls.

The shape of the combustion and expansion space has a very large influence on the number of heat units lost in cooling. The expansion space is of necessity cylindrical, while the ideal combustion space is a smooth and unbroken hemisphere. Omitting the question of structural strength entirely and looking at the matter solely from a cooling standpoint, it is seen that the reduction of exposed area per cubic inch of combustion space is as great as possible in the dome shape of head and since the amount of cooling is a function of the area exposed the advantages of this type of head for the combustion space is evident. Since it is impossible to get away from the cylindrical form of expansion chamber; cylinders are designed so that the engine will be suitable for the work required of it and yet give the least area relatively to the volume of the combustion space. We can find the relation of stroke to bore which will give the condition when the relative exposed area is least by solving the equation of the volume for a minimum in terms of the surface. Let L equal the length of stroke, D the diameter of the cylinder, V the necessary designed volume, S the exposed surface.

$$V = \frac{\pi D^2 L}{4} \qquad (1)$$

$$S = \pi D L + \frac{2\pi D^2}{4} = \frac{4V}{D} + \frac{\pi D^2}{2} \qquad (2)$$

Let

$$\frac{dS}{dD} = 0 \quad \frac{dS}{dD} = \frac{4V}{D^2} + \pi D = 0, \quad \pi D = \frac{4V}{D^2},$$

therefore $D = \sqrt[3]{\frac{4V}{\pi}}$ (3)

But

$$L = \frac{4V}{\pi D^2} \text{ from (1) and } D = \sqrt[3]{\frac{4V}{\pi}} \text{ substituting } D = L. \qquad (4)$$

That is, the surface of a cylinder of given volume is least when the diameter equals the length. Other practical factors entering in, however, make it better to have a different relation of bore to stroke than that just deduced.

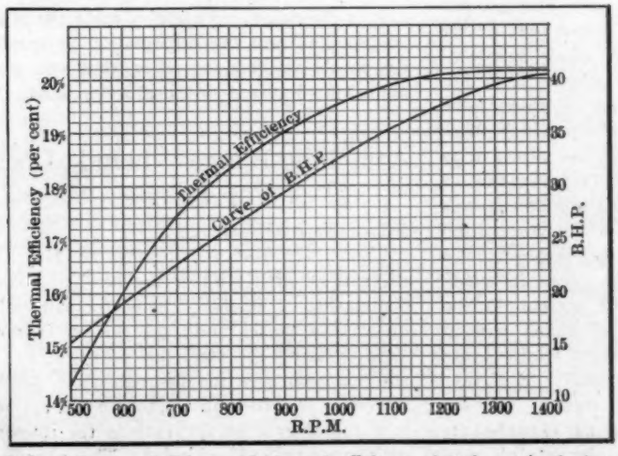


Fig. 3—Curves of B.h.p. and thermal efficiency plotted on the basis of revolutions per minute

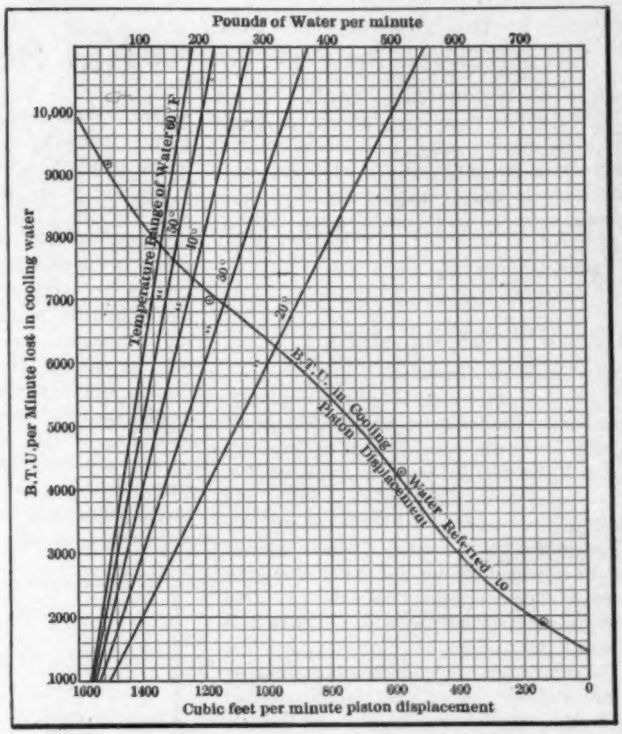

Pounds of Water per minute
100 200 300 400 500 600 700
B.T.U. per Minute lost in cooling water
10,000 9000 8000 7000 6000 5000 4000 3000 2000 1000
Temperature Range of Water 60° F.
B.T.U. lb. Cooling Piston Displacement @ Water Referred to
1600 1400 1200 1000 800 600 400 200 0
Cubic feet per minute piston displacement

Fig. 2—Curves of B.t.u. in cooling water and temperature ranges. These curves are read vertically from the base up to the curve of B.t.u. in the cooling water, then horizontally to the temperature range curves

The thermal efficiency is affected by many conditions after the engine has reached 1,200 or 1,300 revolutions per minute and, as will be seen in Fig. 3, the slope of the curve, which measures its rate of increase, will fall off appreciably. The curve of brake horsepower will also start to fall off as the revolutions per minute become excessive and the difficulties of overcoming the inertia of gases and reciprocating parts of the engine increase. Fig. 3 was taken from tests on a 36-horsepower motor and is fairly representative of an egnine of that rating. The engine was six-cylinder, four-cycle, having a bore of 3 15-16 inches and a stroke of 4 3-4 inches. The rating is according to the A. L. A. M. formula.

Loss of Power in Motor

Where fiber gears are used to drive the camshaft an evasive squeak will often be heard which can be traced at times to the fiber gears which have swelled so that they no longer fit their driving pinions. The remedy is not hard to apply and will be found to be a success.

SOMETIMES the motor will not be developing its usual power and an unusual scraping sound will be heard. This trouble often occurs with engines having fiber gears to drive the camshafts, which have been in service for some length of time. The cause is the swelling of the gear wheels due to the absorption of the oil, the gears expanding and meshing too tightly with the steel driving pinions, or, at the same time, swelling laterally and rubbing against the casing. This will heat the camshaft bearings.

The remedy lies in replacing the fiber gears or in recutting the teeth of the gears and reducing the pinion to normal thickness by planning or turning in an engine lathe.

A HABIT that can be readily acquired by a new driver is that of throwing out the clutch when turning a sharp curve at any speed. Severe torsional strains are averted and tires saved by this precaution.

Increases the Power of His Engine Thirty Per Cent.

Editor THE AUTOMOBILE:

[2,779]—The accompanying sketch (Fig. 1) illustrates a change I made in my automobile engine which increased the power 30 per cent.; thinking the same may interest some of your readers I am sending it to you. H. W. BARTOL.

Philadelphia, Pa.

Clutch Jerks on High Speed

Editor THE AUTOMOBILE:

[2,780]—I am a subscriber to your magazine and would like to know what is the trouble with the cone clutch on my car. When I put the clutch in on high speed it does not seem to take hold; it jerks and pounds, whereas when I hold it half in only it does not pound so much. I have oiled it and have wiped off the oil, but it does not seem to have any effect. Would you give me some idea of the trouble? DECORATOR.

Sarnia, Ont., Canada.

The symptoms of your trouble seem to point to either one of two things. Either the leather has become lifeless and lost all its elasticity or the transmission and the flywheel are no longer in proper alignment.

May Be Due to a Variety of Causes

Editor THE AUTOMOBILE:

[2,781]—Will you kindly inform me through your columns to what cause the following may be due: A friend of mine has a four-cylinder machine which has been run about 10,000 miles. Whenever the throttle is wide open all the cylinders work fine, but when the throttle is closed only two cylinders work. If you could give me any information on this matter I would greatly appreciate the same.

FRANK MOSHER.

Roberts, Ill.

Owing to the lack of detailed information at hand it is impossible to specificize an answer. The trouble may be due to several causes which may be searched for in the following order: First, test for a spark at all the cylinders while the engine is running at low speed; if this test shows that the current is satisfactory try closing the gaps between the points on the spark plugs in the missing cylinders. If the current is not satisfactory the trouble might lie in a dirty magneto distributor. Having eliminated the ignition system as being the source of trouble there remains the gas supplied to the cylinder which may be the cause of trouble. Examine the intake line at all parts between the carbureter and the intake manifold of the engine for leaks, clean the dirt out of the carbureter and if the disturbing element is not located as one of these, the throttle lever is apt to close the valve too much, thereby supplying very little gas at low speeds.

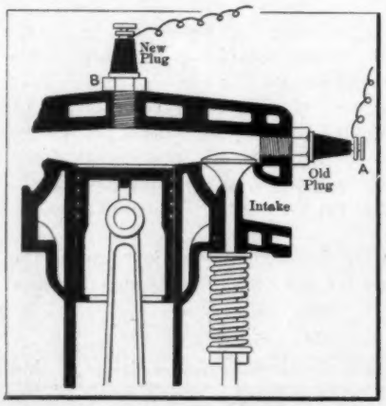


Fig. 1—Illustrating the manner in which a reader increased the power of his motor by 30 per cent.

What Some Subscribers Want to Know

The Editor invites owners and drivers of automobiles who are subscribers to THE AUTOMOBILE to communicate their automobile troubles, stating them briefly, on one side of the paper only, giving as clear a diagnosis as possible in each case, and a sketch, even though it may be rough, for the purpose of aiding the Editor to understand the nature of the difficulty. Each letter will be answered in these columns in the order of its receipt. The name and address of the subscriber must be given, as evidence of good faith.

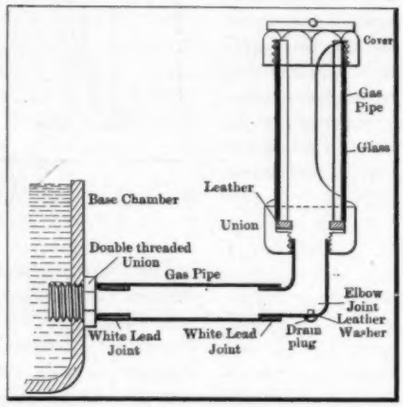


Fig. 2—Method of making and attaching an oil level gauge to the base chamber with standard pipe fittings

Wants to Install Oil Level Gauge on Crankcase

Editor THE AUTOMOBILE:

[2,782]—I have a car which is lubricated by the splash system. The oil reservoir is located in the lower part of the crankcase and carries the whole supply of oil for the engine. At present it is impossible to tell how much oil there is in the crankcase or if the pump which takes the oil from the reservoir and places it in the splash chambers is working or not, as there is no sight feed on the motor nor is there a level gauge. Will you kindly tell me how to go about installing either a level gauge or some other device to ascertain the amount of oil present in the crankcase at any time? I thank you in advance for the information which I am sure will be of general interest. R. F. G.

San Antonio, Texas.

A very good level gauge may be attached to the average crankcase with very little expense since it can be made up of standard plumbing or gas fitting parts. As shown in Fig. 2, it will be made up of a double-threaded union, a piece of gas pipe, an elbow and the other parts illustrated. If the specifications in the sketch are carried out a very neat and satisfactory job should be the result.

Hears a Mysterious Rattle Beneath Car

Editor THE AUTOMOBILE:

[2,783]—I have noticed a rattling sound some place in the car and have been unable to locate it. The noise seems to come from some place in the transmission or differentials; it is not a constant rattle, but is only noticeable on first and second gears, and it seems as though the car only rattles in going around sharp corners or up an uneven grade. The machine has only been run about 800 miles and has been well oiled and greased at all times. I sometimes speed the car up on the lower gears and notice that the rattle will cease. If you will give me any information through your columns as to the method of locating and remedying the trouble, same will be greatly appreciated.

A SUBSCRIBER.

Selmer, Tenn.

It is difficult to accurately locate the seat of trouble from the information at hand; we would suggest, however, that you examine the internal floating brake bands.

Attaching Blame Where It Does Not Belong

Editor THE AUTOMOBILE:

[2,784]—In THE AUTOMOBILE of May 11 there is an article under the head of "The Tempering of Steels." I tried the salt bath on a cold chisel and find that it is not right, making the steel too soft.

Could you give me through your paper a method by which an amateur could arrive at a fair degree of accuracy in the matter of tempering cold chisels? The average thing that is sold in tool kits for a cold

What Other Subscribers Have to Say

The Editor invites owners and drivers of automobiles who are subscribers to THE AUTOMOBILE to communicate their personal experiences for publication in these columns for the worthy purpose of aiding brother automobilists who may be in need of just the information that this process will afford. Communications should be brief, on one side of the paper only, and clearly put, including a rough sketch when it is possible to do so, and the name and address of the writer should be given as evidence of good faith.

chisel is far from what the name implies. Most of them break with the first blow.

Perley, Minn. J. E. RICHARDS.

In trying the salt bath in the process of tempering a cold chisel you very improperly blame the bath instead of questioning the quality of the material in the chisel. If the cold chisel is composed of steel including from 60 to 80 points of carbon it will take temper if it is heated to a cherry-red and quenched in either water or a salt bath. It is more than likely that the cold chisel used in your test is some cheap imitation holding carbon below 20 points.

One reason why cold chisels break so readily as referred to by you lies in the fact that they are not "drawn" after they are tempered. The right way to proceed is to heat the chisel to a full cherry-red, quench it in salt water, and thereafter draw the temper of the steel to perhaps a "straw" color.

Installing a Strainer and Cover on Oil Tank

Editor THE AUTOMOBILE:

[2,785]—I have at my disposal a small shop in which I make little repairs on my machine as they happen to be necessary. The car is rather old fashioned and is not equipped with a very suitable cover on the oil tank. There is no strainer and I am very liable to get foreign matter into the tank. Could you tell me of an easy method of making a cover which will contain a strainer?

READER.

Bath, Me.

The accompanying cut (Fig. 3) illustrates one method of making a cover and strainer for an oil tank, which will be found to be satisfactory and easy to make. A threaded ring is soldered into the tank as shown. A piece of tubing fits into this ring and supports the strainer, which is held in place by the tube, which is turned down as shown. The cover fits over the filler opening and provides a dust-tight seal.

Fooling Prospective Chauffeurs

Editor THE AUTOMOBILE:

[2,786]—In taking my examination for a chauffeur's license at the secretary's office I was given the following question: Name several methods of running an engine on compression when the low gear is engaged. I could only answer in one way. Will you kindly tell me other methods of doing this? G. B. M., JR.

Brooklyn, N. Y.

Unconventional Type of Differential

Editor THE AUTOMOBILE:

[2,787]—I understand that there is a French car made that used a type of differential in the live rear axle different from the conventional, inasmuch as the sides of the bevel pinions are approximately the same. Give an explanation of the workings of this type of differential.

Brooklyn, N. Y. DESIGNER.

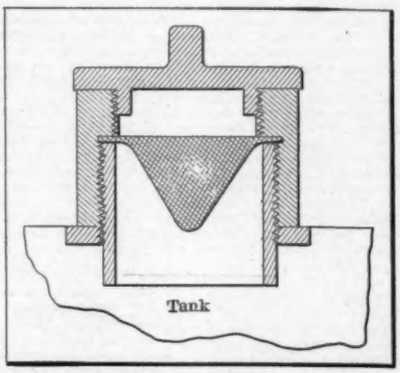


Fig. 3—Showing a home-made oil-tank cover and filler cap containing a strainer to remove the foreign matter from the oil

The type of differential you probably allude to will be seen in Fig. 4. The driving shaft A taking the power from the motor through the transmission is fitted with load and thrust bearings, being an integral part of the gear wheel B. An intermediary shaft fitted with annular load and ball thrust bearings carries two pinions. The bevel gear wheel C meshes with B and transmits the power to the gear wheel D, which is keyed to the shaft. The straight pinion E is bolted to the boss F, which contains a set of star pinions. The jackshafts, which have square ends, fit into corresponding holes.

Wants a Little Tire Information

Editor THE AUTOMOBILE:

[2,788]—I am taking the liberty of asking you a question in regard to a tire for my machine. Would I require a smaller tube for the tire if I used a liner? I use 30 x 3 1-2 inch tires and would like to know if it would be right to get a smaller tube if I should use the liner, or if the same size would be suitable. Any information would be appreciated. ED. C. BATES.

Clarksville, Tenn.

The same size tube would be required whether you used the liner or not.

Wants Information with Reference to 1912 Specifications

Editor THE AUTOMOBILE:

[2,789]—Can you give me any information in regard to the specifications of the 1912 Cadillac? Will they have a four-speed transmission and will they have a 4 1-2 x 5 motor? Will the wheelbase be longer?

Corvallis, Ore. WALTER H. KLINE.

Up to the present moment the company has not made any announcement as to its 1912 models, and no doubt you will be able to get the information you desire from the factory direct.

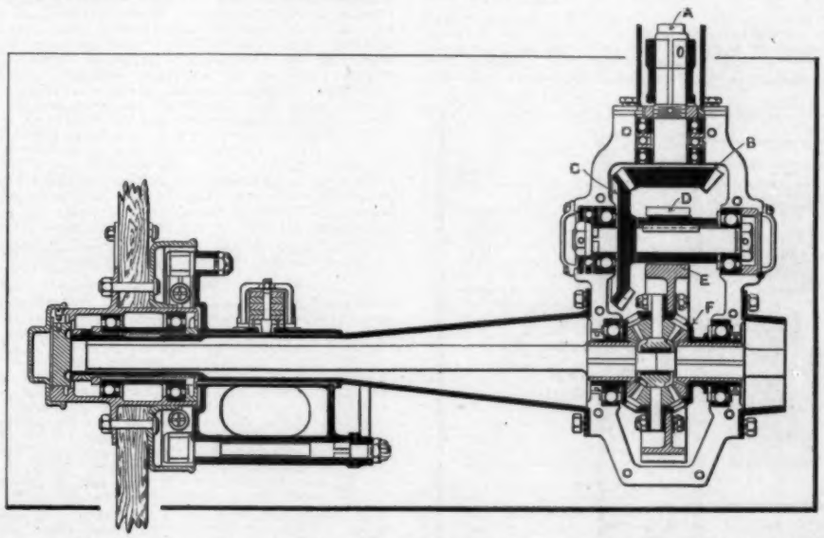


Fig. 4—Section through a live rear axle showing the method of operating the driving pinion by straight tooth gears

Meeting Recurring Troubles

Presenting a Series of the Most Probable Cases

A series of co-related short stories, accompanied by diagrams and characteristic illustrations, indicating the nature of the troubles that are most likely to happen to automobiles, discussing their causes and effects, all for the purpose of arriving at a remedy. It is the aim, for the most part, to show how these troubles may be permanently remedied, and as a secondary enterprise it is indicated how the automobilist can make a temporary repair, thereby enabling him to defer the making of a permanent repair until a convenient time arrives.

THE BUTTERFLY VALVE.—The throttle valve is the valve which, in conjunction with the spark timer, governs the speed of the car and relatively the amount of fuel it consumes. This valve is of necessity positive in action and must give a wide range in the size opening of the inlet pipe. There are two types of throttle valves which are in general use at the present day; they are the butterfly valve, as shown in Fig. 1, and the plug type, which is not so often used on motor cars. The butterfly type of valve is arranged so that a rotating metallic flap (the butterfly), which is actuated by a spindle, can be turned so that it shuts the pipe completely and thereby throttles the inlet pipe. The opening is a maximum when the butterfly is parallel with the pipe. In this case the opening is not obstructed except by the thin metal disk which forms the valve and which is so narrow that the flowing gases are not checked to any appreciable extent. Generally the throttle valve forms a part of the carbureter and the spindle is continued up a distance above the inlet pipe to allow room for a governing lever. To this is attached the throttling mechanism, which, of course, is controlled from the steering wheel throttle lever.

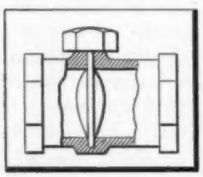


Fig. 1—Illustrating a common form of butterfly throttle valve. The valve is often punctured by a small hole so that the engine will just turn over when the valve is closed

The plug type of throttle valve is found for the most part on steam apparatus. It is a cylinder or cone in which there are either a number of slots or in other cases one. The cylinder is hollow and can turn on its axis or can slide longitudinally. The slot is arranged so that as much of it as is needed can be exposed, allowing the fluid to pass through. The opening is a maximum when the whole slot is exposed or a minimum when the slot is behind the bushing. The advantage of this type of valve is the great nicety to which it may be adjusted. This advantage is possessed to a great degree by the butterfly type as well.

CARE OF STUFFING BOXES.—No matter where the mechanician's field of activity is located, whether in a garage equipped with machinery or in the country home, where the machinery of the garage is used to pump the water and perhaps light the house, he is going to strike at some time or another a stuffing box which needs repacking. The average stuffing box will hold its packing in a water-tight or gas-tight condition for a great length of time before it needs replacing. When the time does come to replace the packing it is not as a general rule necessary to send the box to a repairman, but the work can be done at the garage by anyone who understands the construction of these devices. The accompanying cut (Fig. 2) gives the usual form in which the stuffing boxes are made. The cover is always made removable and the packing can be taken out after the cover has been removed, new packing can then be placed in position. The packing used will, of course, depend upon the nature of the service to which the stuffing box is to be adapted. A leaking stuffing box does not always have to be repacked, as there is an easy method of adjustment to tighten the pressure on the packing, which will stop leakage if the material used for packing is in fair condition. In the type shown in the illuustration, if the nuts on the ends of the bolts are tightened the packing will be squeezed against the shaft and the leakage will generally be stopped. In tightening the adjustment of a packing box the nuts should not be tightened any more than is required for a non-leaking joint, for if this is done a large amount of friction will ensue which helps to cut down the efficiency of the machine besides heating the bearing and wearing the parts.

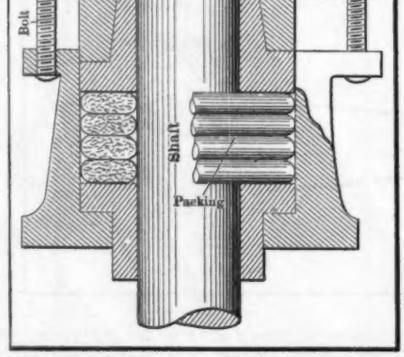


Fig. 2—Simple packing or stuffing box which may be adjusted by the tension on the bolts

SHEET METAL JOINTS.—There are two types of sheet metal joints which are in general use, they are the lap joint and the butt. To resist a pull of any amount the butt joint possesses the greater strength, as in order to fail two rows of rivets must be sheared or the butt strap must fail by tension. An examination of Fig. 3 will show the relative merits of the two systems of making joints and give an idea of the comparative strengths of the two. The joint most used in automobile practice, in such places as the channel automobile frames, is the butt joint. This type of joint may be welded or held in place with a butt strap, as the illustration shows. Very often in heavy work there are two butt straps employed which give a large amount of additional strength, in this case the rivetting is either double or triple. It is not used in automobile work, however, as there are no requirements for it.

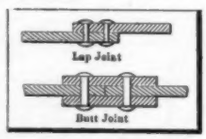


Fig. 3—Showing a double rivetted lap joint and a double strapped butt joint—two common forms of sheet metal joints

RELATIONS BETWEEN TIRE PRESSURE AND FLEXURE.—The following tables show the amount of flexure of the tires taken promiscuously, as compared with the size of the tire at the top:

Tests on Rear Wheel of Empty Seven-Passenger, Six-Cylinder Touring Car Fitted with 37 x 5 Plain Tread Tires.

Pressure in pounds per square inch	Measurement of tire on top in inches	Measurement of tire at bottom in inches
105	4 9-16	4 1-16
100	.....	4
90	.....	3 7-8
80	.....	3 13-16
70	.....	3 25-32
60	.....	3 3-4
55	4 1-2	3 3-4
50	.....	3 11-16
40	.....	3 5-8
30	.....	3 7-16
20	.....	3 1-8
14.7	.....	2 13-16

The extreme widths of the tire at the pressure that the tire was found to contain, viz., 55 pounds, measured with a pair of calipers, were as follows: Top, 5 5-16 inches; side, 5 1-4 inches; bottom, 4 3-4 inches.

Tests on Front and Rear Wheels of Limousine Fitted with 36 x 4 1-2 Tires.

Pressure in pounds per square inch	Front Tire Top	Front Tire Bottom	Rear Tire Top	Rear Tire Bottom
90	4 1-16	3 3-8	4 1-16	3 3-8
80	.....	3 1-4	.....	3 5-16
70	.....	3 7-32	.....	3 1-4
60	.....	3 3-16	.....	3 3-16
50	.....	3 1-8	.....	3 1-16
40	.....	.....	.....	2 7-8
30	.....	.....	.....	2 5-8
20	.....	.....	.....	2 3-16
14.7	.....	.....	.....	1 13-16

BEST WAY TO "SET OUT" PISTON RINGS.—Cast-iron piston rings may be set out by means of a pien hammer, just as was formerly done with steel steam rings. The only thing is that the work must be done more slowly and more carefully. There are machines on the market in which the rings are turned concentric, and then made elastic enough to spring out and nold against the cylinder walls by hand-piening on one side of the ring. The number of examples of this are few in America, but a number of French car makers use it.

GEARS AND PINIONS MUST HAVE DURABILITY.—The great factor in the design of involute gears and pinions is the angle of obliquity or pressure. This angle can not be made standard for all sizes of gears as for instance in using a pinion of ten teeth with the common pressure angle of 14½ degrees the flanks of the teeth will be undercut too much and the tooth materially weakened. Take for example Fig. 4, which shows a segment of a gear of ten teeth, four diametral pitch. The angle of obliquity causes the teeth of this pinion to be undercut to such a degree that its durability would be considerably shortened, hence gears that are to do heavy work may require a greater angle of pressure than 14½ degrees if they are to run with a pinion of less than 12 teeth.

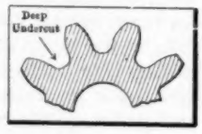


Fig. 4—Showing gear with excessive undercut

In the choice of an angle of pressure some idea of the correct angle may be obtained from Fig. 5, which is taken from a ten-tooth gear, four pitch, the angle of pressure being 22½ degrees. The greater strength of the gears in this figure is readily seen. In any case the angle can not be much more than 32 degrees and have the addendum of the teeth, the ordinary height which is equal to one of the diameter pitches or the module.

LIQUID IN MIXTURE IS MISCHIEVOUS.—Gasoline as light as octane will vaporize sufficiently well in the carbureter and the intake line to justify its use in automobile work. The heavier products, however, vaporize but poorly and cause the most annoying crankiness on the part of the motor due to the deposit of carbon, which can be so often traced to these fuels. Octane is just about on the border line and a gasoline which contained any quantity of it would be a very poor quality indeed, a trace of it will be found to be present as a rule though and if it is not in too large quantities it will vaporize sufficiently well to allow it to just pass.

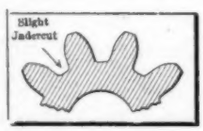


Fig. 5—Segment of 10-tooth, 4-pitch gear

The accompanying cut, Fig. 6, will show a common form of trap which may be placed in the intake line. This trap will catch the liquid globules as they pass through the pipe and drain them into the recess which forms the lower part of the trap. The liquid strikes the baffle plate, which protrudes into the intake pipe and fall through the hole into the retainer located below. If the liquid gasoline should pass into the cylinder itself and burn there the result would in time be a deposit of carbon on the piston head or some other part of the combustion space. This carbon would in time start to glow and thus cause preignition, and hence a pound in the motor.

A set-bolt placed in the bottom of the trap plays the rôle of a drain and in case of its becoming filled it can be emptied by means of this arrangement. To elaborate on this idea it is only necessary to hot-water-jacket the reservoir and thereby enrich the mixture with the gas generated by the heated nonane or pentane, as the case may be.

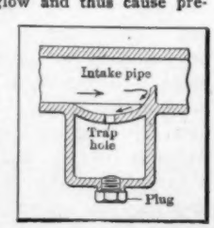


Fig. 6—Common form of gasoline trap inserted in intake line

REMOVING PISTON RINGS FROM PISTONS.—In removing piston rings, lay down on the surface of the piston three or four strips of very thin flat steel. Raise the first ring out of its groove, either by expanding it by means of special tongs or by simply picking it up as best you can. Then slide the flat strips of steel under this and slide the ring along on the strips until the top is reached, when it may be picked off. The reason for the strips of steel is, first, to allow the rings to slide easily, having a uniform surface to slide on, and, second, to prevent the second and later rings from drooping into the open grooves made by the first ring. It is not always convenient to take the bottom ring off first, and even if it were done there would be the other rings to pass over, which is just as difficult as passing over an open ring space. Care should be taken not to scratch the delicate surface of the piston rings with the hard pieces of metal.

OIL LEADS OFTEN CLOG.—In the force-feed system of oiling there is generally far more oil supplied to the motor than is absolutely necessary. The usual methods of force-feed oiling do not depend altogether on the force-feed system to do all the lubricating of the machine, but have an auxiliary splash system. Many very fine systems, however, rely wholly on the force-feed and while there is as a rule a good margin of safety left when the system is designed, a plugged-up oil lead may have very serious consequences if not detected after a time. There are several ways of conducting the oil from the mechanical oiler through the motor, the most common being that of leading the oil to the main bearings and from there through the drilled crankshaft up to the lower connecting rod bearings. The force pump is considerably aided by centrifugal force in sending the oil on its way to the crank bearings, so that when the oil reaches this point it has the necessary momentum to send it up into the wrist pin bearing.

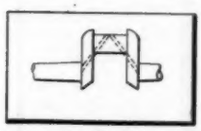


Fig. 7—Slanting oil leads cut in crankcheek and pin, very often used in conjunction with centrifugal ring

Should the hollow crankshaft become stopped up the oil would take a different course than that which it is intended to take, thus leaving the bearings dry. There are two ways of drilling the crankshaft in common usage. The most frequent, shown in Fig. 7, is drilled on a slant directly through the crankpin and crankcheek into the crankshaft. Or, if the leads are not drilled into the crankshaft they are led to an oil ring called a centrifugal oiler, which is a ring resting on the crankshaft. The ring is arranged with a rim so that as the oil is sent to the perimeter by centrifugal force, it is retained there, while the oil which is opposite the hole in the crankcheek is forced through up the slanting grooves into the lower connecting rod bearing. The method of drilling the oil leads through the crankshaft depicted in Fig. 8, is of course, not adapted to the centrifugal ring, but is intended for cases in which the oil is sent through the crankshaft from the main bearing by means of an oil hole and from there is forced up to the various leads until it reaches the wrist pin.

A stoppage of the oil flow within the crankcase itself would not be such a serious matter at medium speeds, as there is always an oil vapor in the crankcase which is generated by the swiftly revolving cranks. Should the new supply be cut off for any length of time though, the results would become very serious if heed were not paid to the warning signs which would be given forth by the heating motor. A sudden loss of power and perhaps pre-ignition causing a knock while turning at low speeds would evince itself if the case were serious enough to cause a shortage of lubricating matter to one of the bearings.

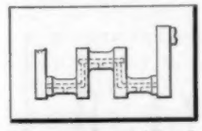


Fig. 8—Oil leads in crankshaft used in force feed system where oil is pumped up as far as wristpin bearings

Should the sight feed indicate that the oil were flowing properly and still these indications of overheat forced themselves into prominence it would often puzzle even an experienced driver, as he would probably put the blame on the water circulating system at first, and if that proved to be all right, would then wonder what the trouble was. When the oil leads are drilled they are of course drilled all the way through the various pieces of metal and are then plugged to the required depth by means of a screw. When the leads become stopped up within the crankshaft or crankcheek these openings prove themselves a real boon, as the screws simply have to be removed and a copper wire run through the hole to remove the residue which has been deposited therein. A warning may be read in the fact that this impediment to the flow of the oil will be found to be a thread of cotton waste much more frequently than an impurity which was present in the oil when bought.

The reason for this oil waste being found so often in the oil circulating system is that when cleaning out the tank or other parts of the machine cotton waste will be employed to wipe off the superfluous matter. This waste will leave threads on the rough walls of a casting, which work loose and collect in some place where they will eventually give a great deal of trouble. When using waste around any part of the machine which comes in contact with moving parts it should be very carefully removed so that accidents of this nature do not occur.

DRAINAGE TROUBLES WILL CROP UP.—The makeshift drainage trap which is often slapped into place by an incompetent or perhaps an amateur plumber, which often amounts to the same thing, is as a rule a rather ineffective piece of mechanism. The greatest mistake is to put a bend in the pipe under a drain and expect it to perform the office of a trap in a satisfactory manner. It might do so for a time but eventually will cause trouble. Smells are bound to arise from a drain if it is not adequately protected from them by some means of sort of baffle, a water-sealed bell by preference. The cuts shown herewith illustrate the correct and incorrect types of trap to use. Fig. 9 illustrates the unsatisfactory type which is often installed in careless work. Fig. 10 shows the bell type. The drainage first flows through a strainer so that no large pieces of solid matter are allowed to flow into the drainage pipe in the first place, so that there is a very small chance for the system to be clogged in this manner. The water is poured in as shown until it covers the edges of the bell baffle, thus effectually sealing the waste pipe so that no smell can pass from the foul pipe up through the strainer into the garage or whatever is being drained by the system. The cup formed by the casing of the trap below the bell can be very readily cleaned out by removing the strainer cover and by means of a wire or small scraping tool the sediment can be taken out. This should be done very often so that the bell trap does not forfeit its own purpose and become a trap for waste matter instead of a device to prevent foul atmosphere in the space which the drainage system takes care of.

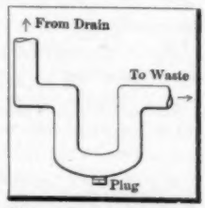


Fig. 9—An amateur's job commonly seen. A very poor form of trap

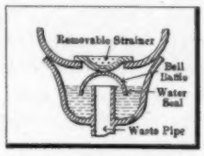


Fig. 10—Bell stench trap used in careful drainage work to keep dangerous odors from the room drained

ACTION OF THE CENTRIFUGAL PUMP.—The action of the centrifugal pump is practically the exact reverse of the action of the ordinary water wheel with which we are nearly all familiar. The efficiency of the water wheel and the conditions under which it acquits itself with the greatest amount of satisfaction are the same as those under which the water turbine is found to be of the greatest use and satisfaction, that is, where there is a positive and continuous flow to be maintained against a back pressure or head which is not excessive.

The power given to the shaft of the centrifugal pump is transferred to the water by means of a series of radial vanes which are illustrated in Fig. 11, showing a section through the pump chamber. The water is led to the center of the revolving group of impeller vanes and is picked up by the slower moving parts at this point without shock or noise. It is then conducted by means of centrifugal force to the outer ends of the vanes. During the flow to this point the water has accumulated a greatly accelerated motion and pressure until it has absorbed all the power which is transmitted to the pump shaft and has not been lost in mechanical ways, as in overcoming friction, etc. The most satisfactory pump will be the one which has given the water the maximum velocity and pressure with the minimum amount of noise, shock and friction.

The water pump on an automobile is generally of the centrifugal type, and for the use it is almost ideal since there is no appreciable head to pump against and the velocity of flow is required to be somewhat high. The water pump is generally driven on a full-time gear ratio, that is, the speed of the pumpshaft is the same as that of the crankshaft. Very often the magneto is driven off the same shaft as the water pump, the shaft in most cases running longitudinally with the motor. There are a few notable exceptions to this, however, the shaft being placed laterally across the front end of the engine.

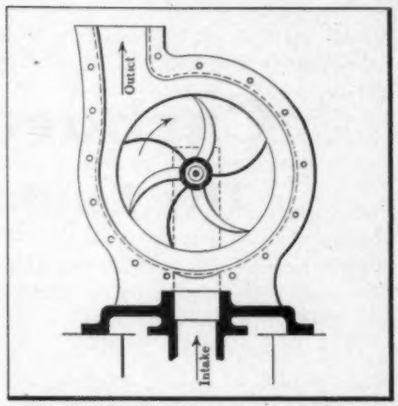


Fig. 11—Common form of centrifugal water pump, much used on automobile water circulating systems

In a case where the pressure required is high it is obtained at the expense of the velocity. The speed of the water is slowed down in an annular diffusion space which is designed so that the contraction is as gradual as it is possible to make it so that there will be no needless waste of energy in making eddies or whirlpools within the casing. With a proper design of the diffusion space and volute it is possible to transform nearly all the energy of velocity into that of pressure so that the pump is capable of working against a normal head without any difficulty if it is well designed. The automobile water pump has not much head to overcome, as a rule, so that the pump can be designed to give a very satisfactory velocity through the water jacketing. This velocity is of great importance, as the effectiveness of the cooling fluid depends to a large degree on the rapidity with which it is renewed.

Since the continuity of flow is of great importance in the automobile water pump it is necessary to furnish a uniform supply of water to all the parts of the inlet or suction opening of the impeller, for unless all the impeller vanes get the same supply of water the continuity will be interrupted.

A TOOL OF GREAT UTILITY.—Clamps are of such universal use that it is not usual to find a garage or any shop where there is any repairing done at all which is not equipped with a number of these instruments. In purchasing clamps great care should be taken that they are adapted for the work to which they are to be put. The accompanying illustrations show two types of these tools. The clamp shown in Fig. 12 is a cheaper tool that that shown in Fig. 13. It is a very good tool, however, and is very satisfactory if it is able to perform the work. For heavier work, though, the more costly clamp will probably be required. In wood working, tire repairing, and like odd jobs, the lighter of the two will be perfectly satisfactory. In tightening the clamp care should be taken that it is not fastened to some delicate surface which will be damaged by the pressure exerted. If there is any risk of this a piece of soft wood may be inserted which will remove the danger to a large extent. One of the great objections to the type of clamps generally on the market is the winged nut, the projections on which are so small that it is not possible to bring it to the required tightness by hand; in this case a wrench will be required to overcome the difficulty.

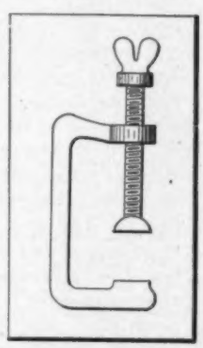


Fig. 12—Type of clamp used in lighter work, such as wood working

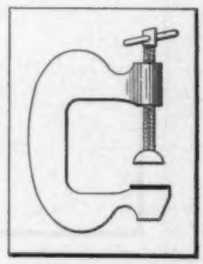


Fig. 13—Heavier clamp employed in metal working or any heavy work where such a tool is required

Carbureters with Sunken Jets

The Tendency in Modern Foreign Practice

This article, which appeared in "La Vie Automobile," discusses the tendency in modern carbureter construction, utilizing several different makes of carbureters as examples in dealing with the principle of the sunken jet. The author endeavors to show what must be done to make a carbureter automatic.

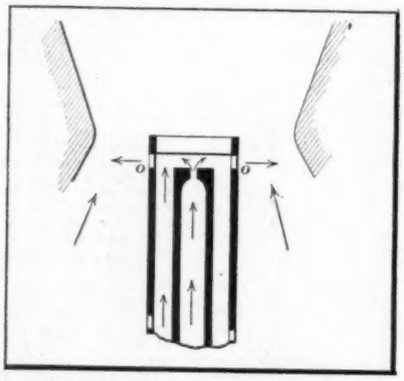


Fig. 1—Section through the Claudel jet showing the air passage way around the jet proper

CARBURETERS with automatic air adjustment seem to be on the decline, according to the author, which no doubt applies to the types manufactured in Europe. The majority of carbureter "specialists" have dropped that idea. The vogue now is for carbureters with a fixed air intake without any adjustment for the air or gasoline and without adjustment for the automatic air intake. The modern method is the regulation of the gasoline automatically.

It is conceded that all methods that assure automatic operation will give the same results; nevertheless the automatic regulation of the gasoline seems to prevail owing to its simplicity and the fact that it eliminates all moving parts.

A mechanism, no matter how delicate it may be, can run for a long time without getting out of order if made with care and fitted methodically. Unfortunately every driver loves to tinker with his carbureter, and more than ever when his ideas of carburetion in general are a negligible quantity. The motor may knock a little; immediately, not enough gas! and he proceeds to close the valve or stop up the additional air ports. With what result? The motor knocks just the same and instead of using 15 gallons it uses 25 gallons. If the motor heats because the fan belt slips or because the ignition has not enough advance, or any other reason for a matter of that, the carbureter is blamed. Too much gas! The jet is given a blow to close the hole and the air holes are enlarged. Result: The motor no longer responds and loses its vivacity. It is a difficult matter to make some drivers understand that for the most part it is a physical impossibility for the carbureter to cause the motor to knock or overheat or at any rate that the influence of the carburetion on these two phenomena is extremely small and should not find a prominent place in daily practice.

As it is difficult to inculcate these ideas into drivers' heads, it remains to give them carbureters that they cannot put out of order owing to the absence of adjustments. Then the only reason for the jet to be taken apart should be initial adjustments or cleaning. Even then if a fine wire gauze filter is interposed in the gasoline circuit it should never be necessary to remove the jet, and if this part were fitted with a difficult means of taking same apart the driver would have little desire to tinker, thus avoiding troubles that might arise from his lack of knowledge.

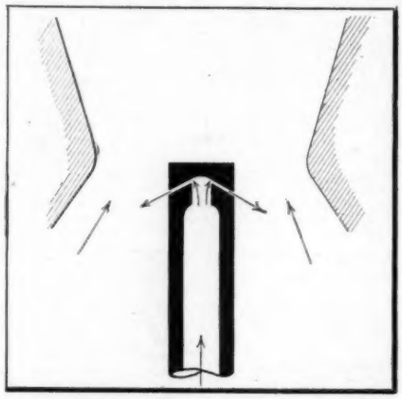


Fig. 2—Section through another type of jet in which the outlet is deflected downwards

Automatic Methods of Regulating the Gasoline

It has for many years been thought impossible to realize an automatic system of controlling the gasoline flow without utilizing any moving part that is affected by the depression caused by the motor. The problem is shortly this: A way has to be found of preventing the gasoline from surging from the jet in too great quantities when the speed of the motor is increased, or, to be more exact, when the depressions on the jet are increased.

Several systems have been proposed in the last few years which can be divided into two classes: placing a braking effect on the gasoline, and the flooded jet.

The Claudel is the prototype of the first system in which an ordinary jet is surrounded by a funnel or air circle. The air and the gasoline leave the upper part at the same time through small holes drilled laterally. It will be understood that at

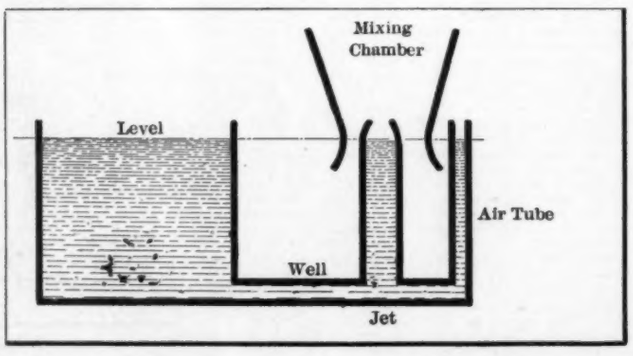


Fig. 3—Section through vapor carbureter, showing the method of sinking the jet under the level of gasoline

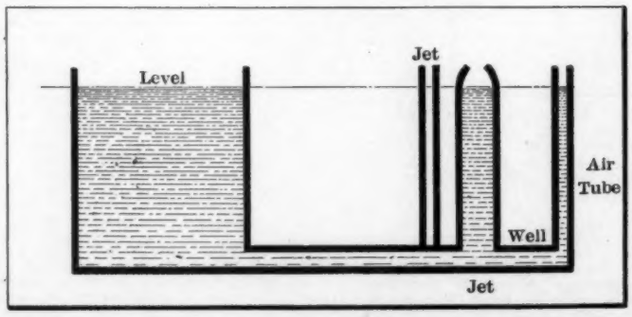


Fig. 4—Section through the Claudel carbureter, showing the well containing the jet and the compensating jet alongside

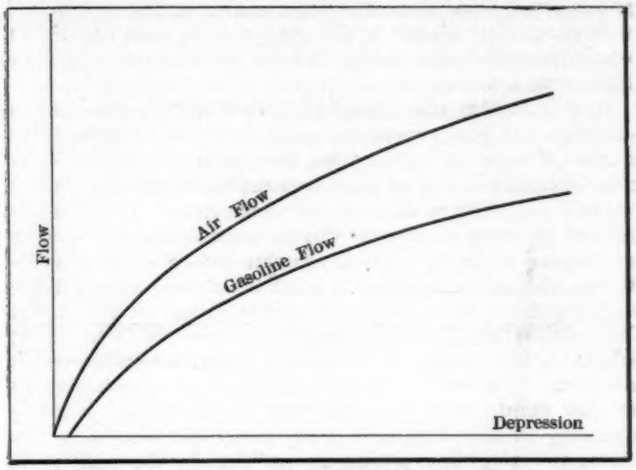


Fig. 5—Diagram representing the differences between the flow of air and gasoline in an ordinary carbureter

high speeds of the motor the air which is forcibly aspirated in the funnel will abut at the end of this chamber, and set up a counter-pressure at the orifice of the jet. It follows that the air chokes the passage of the gasoline and prevents an excess of gasoline at high speeds. On the other hand an energetic mixing is produced in consequence and the gasoline leaves the orifices O in Fig. 1, divided in minute particles, which facilitates its subsequent vaporization.

An analogous system but of simpler construction is shown in Fig. 2, which consists of directing the orifices of the jets so that they are opposed to the direction of the incoming air current. The angle of inclination must be determined by practical tests. At high speeds the air current tends to draw the

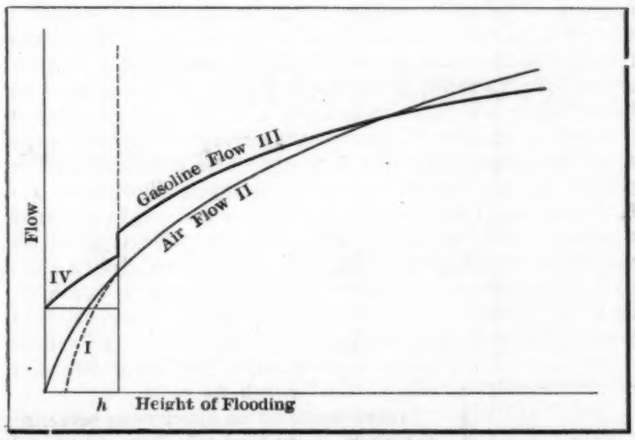


Fig. 6—Curves taken from tests of the Vapor carbureter, the dotted line I indicating the flow of gasoline up to the time the well floods

gasoline from the jet and to push it back at the same time.

The question arises then as to the point where compensation exists, leaving the mixture more or less constant, and this is more difficult to estimate. It is possible to arrive at practical results with the Claudel carbureter, which is in itself an example or proof. But an absolute automatic action is not attained by this method, as may be seen from the slow picking-up qualities and the loss of power on hills. In spite of its simplicity this system has been abandoned by its most staunch adherent, Claudel, who has gone over to the flooded jet.

Flooded Jets

As the name implies, this is a jet placed below the level and through which the gasoline tends to flow constantly on account of the difference in levels. In order to eliminate a mechanical means of closing the jet when the motor is not running it is placed at the bottom of a well, as shown in Fig. 3, the sides of which are slightly higher than the level of the gasoline. When the motor is at rest the well fills up to the level of the gasoline, completely drowning the jet and preventing it from giving off any more gasoline. An air passageway in communication at one end with the base of the well and at the other extremity with the exterior allows air to pass in and carry with it the gasoline given off by the jet.

When the motor is stationary the well and the passageway, as has been shown, are filled up to the corresponding height of the level in the float chamber. As soon as the motor is started a depression is produced in the mixing chamber or throat. The gasoline tends to rise in the well to a height equivalent to this depression. But, as the sides of the well are scarcely any higher than the level, the gasoline leaks or dribbles along the walls of the well and is carried along, at any rate in part, by the lapping effect. At this moment the carburetion is very insufficient because the gasoline that trickles along the outside walls of the

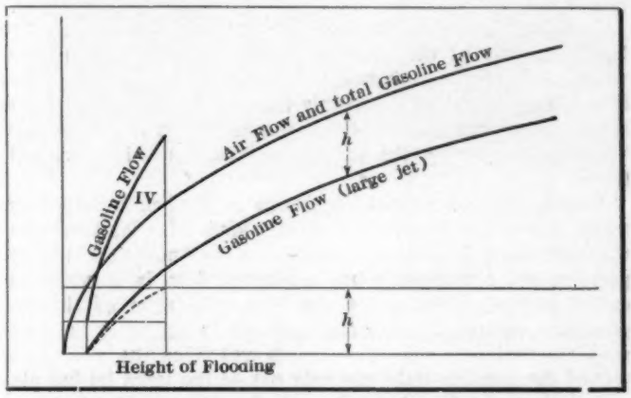


Fig. 7—Curves taken from tests made with a Zenith carbureter

well is not vigorously vaporized and carried in by the current of air. The flow of gasoline is then that of an ordinary jet acted upon by the depression which obtains at the orifice of the well. According to the degree that this depression increases the level decreases in the air passageway and as soon as the depression is equal to the column of gasoline which is flooding the jet, the air will enter the passageway, carrying with it the gasoline that remains in the well, and leave the extremity of the latter, passing into the mixing chamber.

At that moment there is a discontinuance of the procedure, as the depression which exists in the mixing chamber makes itself felt in the base of the well as soon as it is empty. And the moment the gasoline is taken from the well the depression, which was as great as the height of the flooding, suddenly becomes double. Further the flooded jet does not come into operation until the depression is sufficient to expel the gasoline

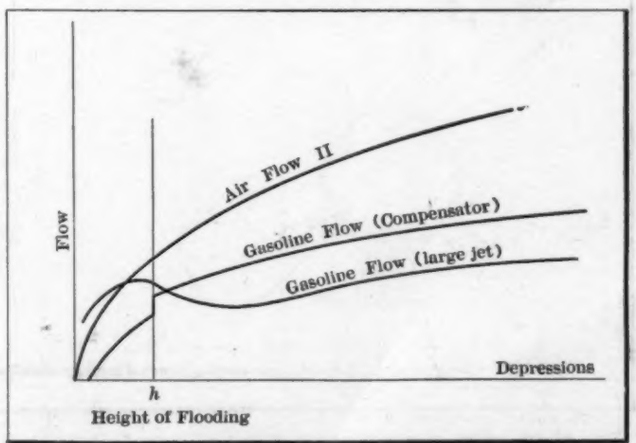


Fig. 8—Showing the flow from the large and compensating jets of the Claudel carbureter, together with the air flow

from the well; but at that moment it is stirred up, leaving the orifice of the well, and then intermingles with the air. The gasoline thus expelled, which operation is not the least of the advantages of the flooded jet, makes an effective combination, producing a good mixture even with small depressions, which is equivalent to slow-speed running for picking up and running on a grade.

With the engine running slow and the car standing still it is necessary to resort to an artifice. In the Vapor carbureter a small lead not shown in the illustration, Fig. 3, takes the gasoline at the mid position of the well and atomizes it on the flap of the butterfly valve. Until the well has been thoroughly primed, and it is always half so, the jet sprays into the mixing chamber. Fig. 6 shows the relation of the curves of the gasoline flow, which more nearly approaches the air flow than is obtained in ordinary carbureters, the relative curves of which are shown in Fig. 5. It is impossible to arrive at perfect compensation with this type of sunken jet, but on the whole a good result is obtained.

As a matter of fact the delivery of the gasoline is caused to leave the axis of the abscissæ from another point; in other words, it is displaced horizontally instead of vertically, which is necessary to assure a perfectly theoretical compensation. Too much importance must not be attached to these reasonings, which are rather in the nature of indications than scientific truths.

Another type of flooded jet obtains in the Zenith carbureter, which was probably the first of this kind. In this carbureter the sunken or flooded jet, which is not submitted to the depression and consequently has a constant flow, is in communication with an ordinary jet and the combination of the two permits a theoretical automatic operation which is at the same time practical. At very slow speeds and when the well is not primed the gasoline leaks not only out of the large jet but also out of the cap. The large jet and the compensator therefore deliver both at the same time. Unfortunately, however, the gasoline that flows does not become entirely utilized in the suction unless a hot air intake arrangement is provided. In order to have the gasoline thoroughly atomized it is precipitated on to the flap of the butterfly valve and as it is given off by a sunken jet it is delivered in constant and equal quantities independent of the depression. The horizontal line in Fig. 7 denotes this. The total gasoline flow is represented by the curve IV. This curve is purely theoretical, as all the gasoline is not carried along. From the moment that the well is filled the air and gas curves become confounded.

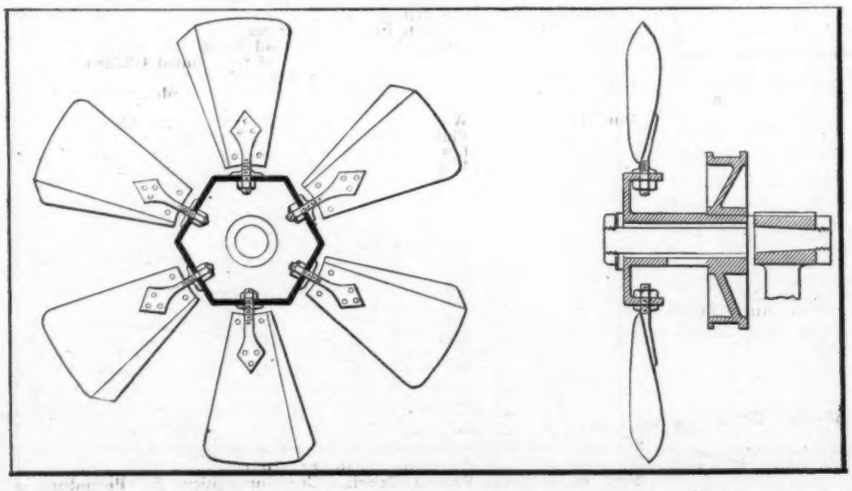
The new Claudel carbureter is very similar to the preceding ones, but it is very difficult to theoretically explain its workings. As a matter of fact a sunken jet under the influence of the depression and identical to the Vapor shown in Fig. 3 is joined with another jet similar to the older type as shown in Fig. 1, which means in other words that the old Claudel jet is combined with a sunken jet.

It is clear that this disposition is not entirely automatic in operation. In fact, a given depression above the choke throat or a given flow of air and a given flow from the sunken jet do not correspond to a fixed flow from the large jet. This flow is variable according to the aperture of the choke. It is not possible to represent the flow of this jet according to the workings of depressions in the mixing chamber before arriving at the throat. Therefore a curve is given which will approximately correspond to the working of a motor giving off full torque. In practice this lack of automatic operation is perhaps very small; in fact, it may be a negligible quantity under certain conditions. The duty of the large jet is above all of importance at slow speeds; that is to say, when the flooded jet is hardly operating at all. The weak point in the old Claudel is thus eliminated—viz., slow picking-up qualities—by the addition of the sunken jet. A careful adjustment permits one to arrive at good carburetion for all points of the sector and all practical speeds. This incomplete article shows the new field that has been opened up of late years in carburetion.

A Suggestion in Fan Design

It is no uncommon sight in the Winter months to see radiators on cars partially covered with strips of metal or leather to prevent the water from getting too cold.

THE radiator has to perform the duty of dispersing some of the heat contained by the water after it has fulfilled its task of maintaining the cylinders at a uniform temperature. It stands to reason that the maximum efficiency which will obtain at a given temperature will diminish if the temperature of the water is raised or lowered materially. This phenomenon is exemplified when the fan belt breaks or slips, in which case, if the outside temperature of the atmosphere is high, the water will in all probability boil. Therefore, if the fan is so made that the pitch of the blades can be altered so as to cause a greater or lesser suction, it should be possible to maintain the circulation water at a uniform temperature all the year around. One method of accomplishing this can be seen in the accompanying illustration. The fan bracket carrying the blades and pulley wheel may be cast from aluminum in the manner shown at B. The blades proper are made from sheet aluminum, the sides of which are given a slight bend in the manner indicated. It is possible then to attach the blades to suitable feet which pass through a hexagonal boss, being held in position by spring washers and nuts. The amount of pitch given to the blades will determine the suction through the radiator.



Type of fan, which permits alteration of pitch to maintain the water at an even temperature despite the variations of atmospheric conditions

There would be no difficulty in reversing the pitch of the blades in Wintertime and forcing hot air upon rear side of the radiator, thereby warming it to counteract the low outside temperature. The pitch could be altered without dismantling the fan in any way, as the nuts holding the blades in position are accessible from the rear of the bracket.

The design of a fan in the first place is largely a matter of trial and error, based on experiments until a compromise is obtained which most nearly conforms to the given conditions. Another advantage possessed by this fan is that three other blades may be removed without interfering with the balance in any way. From some tests on this type of fan it was found that by altering the pitch slightly and removing three of the fan blades the circulating water

would retain practically the same temperature in Winter as in Summer.

It may seem difficult to some to determine whether an alteration in the pitch of the blades has increased the suction of air or has caused it to decrease. A thermometer test will show the difference in temperature, but a rough and ready test can be carried out by placing a handkerchief or piece of paper on the face of the radiator, and the ease with which the article can be removed when the motor is running will act as a guide, providing the fan belt has the requisite amount of tension to eliminate slip.

It is of vital importance that the hood should have a good seat upon the ledge of the radiator if the fan is to perform satisfactorily. The practice of fitting a strip of rawhide on the ledge to prevent rattling sometimes leaves spaces for the air to find an inlet which should pass through the interstices of the automobile radiator.

A Novel Motor Wagon Load

The accompanying illustration depicts the bronze statue which has recently been cast in Paris, and which is intended to be erected in the town of Nantes. The statue is no less than 17 feet high, and weighs about 3 1-2 tons. Seeing that it could not be conveyed to its destination either by rail or river, the problem of its transport presented some difficulty. However, after some negotiations, the Aries Automobile Company of Villeuve-la-Garenne, Paris, undertook the work with one of their motor wagons, which, with only a single person in charge, successfully conveyed the statue to the town of Nantes in three and one-half days and entirely without accident. The feat is being duly appreciated in freight automobile circles on account of the difficulties involved.

How a huge statue was transported from Paris to Nantes

TIRE DAMAGE BY CAR TRACKS—One of the great causes of rapid tire wear is the penchant of some chauffeurs to run their machines on the tracks of trolley car lines. Tracks of any description should be avoided as much as possible by careful drivers.

Calendar of Coming Events

Handy List of Future Competitive and Show Fixtures

Shows

Jan. 1-5, 1912.....New York City, Grand Central Palace, Annual Show, Automobile Manufacturers' Association of America.
Jan. 6-13.....New York City, Madison Square Garden, Twelfth Annual Show, Pleasure Car Division, Automobile Board of Trade.
Jan. 10-17.....New York City, Madison Square Garden, Annual Show, Motor and Accessories Manufacturers.
Jan. 10-17.....New York City, Grand Central Palace, Twelfth Annual Show, National Association of Automobile Manufacturers.
Jan. 15-20.....New York City, Madison Square Garden, Twelfth Annual Show, Commercial Division, Automobile Board of Trade.
Jan. 27-Feb. 10....Chicago Coliseum, Eleventh Annual Automobile Show under the auspices of the National Association of Automobile Manufacturers.

Race Meets, Runs, Hill-Climbs, Etc.

Aug. 12-18.....New Orleans-to-Memphis Good Roads Tour, New Orleans *Picayune*.
Aug. 17.....St. Louis, Mo., Reliability Run, Missouri Automobile Assn.
Aug. 25-26.....Elgin, Ill., Stock Chassis Road Race, Chicago Motor Club.
Sept. 1.....Oklahoma, Reliability Run, *Daily Oklahoman*.
Sept. 2-4.....Brighton Beach, N. Y., Track Races.
Sept. 4.....Denver, Col., Track Races, Denver Motor Club.
Sept. 7-8.....Philadelphia, Track Races, Philadelphia Auto Trade Association.
Sept. 7-9.....Hamline, Minn., Track Races, Minnesota State Automobile Association.
Sept. 7-10.....Buffalo, N. Y., Reliability Run, Automobile Club of Buffalo.
Sept. 9.....Augusta, Me., Hill Climb.
Sept. 13.....Grand Rapids, Mich., Track Races, Michigan State Auto Association.
Sept. 15.....Knoxville, Tenn., Track Races, Appalachian Exposition.
Sept. 16.....Syracuse, N. Y., Track Races, Automobile Club and Dealers.
Sept. 18-20.....Chicago, Ill., Commercial Reliability Run, Chicago Motor Club.
Sept. 23.....Detroit, Mich., Track Races, Michigan State Agricultural Society.
Sept. .....Denver, Col., Track Races, Denver Motor Club.
Sept. .....Detroit, Mich., Reliability Run, Wolverine Automobile Club.
Sept. .....Steubenville, O., Hill Climb, Automobile Club of Jefferson County.
Oct. 3-7.....Danbury, Conn., Track Races, Danbury Agricultural Society.
Oct. 7.....Philadelphia, Fairmount Park Road Races, Quaker City Motor Club.
Oct. 9-13.....Chicago, Ill., Thousand-Mile Reliability Run, Chicago Motor Club.
Oct. 13-14.....Atlanta, Ga., Track Races.
Oct. 14.....Santa Monica, Cal., Road Races.
Oct. 15..... New York City, Start of the Annual Glidden Tour, en route for Jacksonville, Fla.
Oct. 16-18.....Harrisburg, Pa., Reliability Run, Motor Club of Harrisburg.
Nov. 1.....Waco, Tex., Track Races, ..aco Auto Club.
Nov. 2-4.....Philadelphia, Reliability Run, Quaker City Motor Club.
Nov. 4-6.....Los Angeles,-Phoenix Road Race, Maricopa Auto Club.
Nov. 9.....Phoenix, Ariz., Track Races, Maricopa Automobile Club.
Nov. 9, 11, 12.....San Antonio, Tex., Track Races, San Antonio Auto Club.
Nov. 27.....Savannah, Ga., Vanderbilt Cup Race, Savannah Automobile Club.
Nov. 30.....Los Angeles, Cal., Track Races, Motordrome.
Nov. 30.....Savannah, Ga., Grand Prize Race, Savannah Automobile Club.
Nov. .....Columbia, S. C., Track Races, Automobile Club of Columbia.
Dec. 25-26.....Los Angeles, Cal., Track Races, Motordrome.
Date indef.....Port Jefferson, L. I., Hill Climb, Port Jefferson Automobile Club.
Date indef.....Riverhead, L. I., Road Race, Port Jefferson Automobile Club.

Foreign Fixtures

Sept. 2-11.....Roubaix, France, Agricultural Motor Vehicle Show.
Sept. 9.....Bologna, Italy, Grand Prix of Italy.
Sept. 10-20.....Hungarian Small-Car Trials.
Sept. 16.....Russian Touring Car Competition, St. Petersburg to Sebastopol.
Sept. 17.....Semmering, Austria, Hill Climb.
Sept. 17.....Start of the Annual Trials Under Auspices of *l'Auto*, France.

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INTELLIGENCE is chained to a stump, as it were, by the man who permits his skepticism to blind his foresight. As an illustration of the devious ways that skeptics arrive at conclusions the following letter will suffice for the purpose: "You continually favor the makers and blame the users of tires. You follow the lead of the tire manufacturers, who advocate a degree of inflation that few cars can stand. I point out also that even the passengers would object to the hardness of the tires that comes from this degree of inflation. In the meantime if the degree of inflation advised by the makers is necessary, why don't you put it up to them to provide tubes that will hold this pressure? I have tires 34 x 4 and am provided with at least 20 tubes that are described as the best makes, but not one of them will sustain under a pressure of 75 pounds per square inch. I find that starting with a pressure as above it is scarcely more than four days before the pressure reduces down as low as 35 pounds. Moreover, I am sure that this pressure does not leak out through the valves. I am informed by one who has every opportunity to know that tires can be made of the type that will scarcely have to be inflated up to the hardness as advocated by you, and my informant also states that a greater mileage may also be expected if the tires are not inflated to such great hardness as you are in the habit of indicating. I believe that you should take this matter up in the interest of users of cars, remembering that the manufacturers of tires advocate a degree of inflation that the tires will not hold, a degree in fact that few people will use, and from all appearances tire makers skulk behind this inflation situation.

(Signed) "H. W. W."

* * *

UGLY as the inference is coming from this reader of THE AUTOMOBILE, it affords an opportunity to point out that the logic of the criticism is defective since, in all fairness, the reader merely accepts the opinion of an individual who claims to have inside information rather than the expressions relative to tire inflation problems as they have appeared in THE AUTOMOBILE from time to time. If our worthy critic will take a piece of wire and bend it back and forth a few times he will doubtless succeed in breaking the wire. If this method of flexing a piece of wire will result in its destruction in a brief space it only remains to observe that flexure in a tire will accomplish the same destruction, but the reason why cotton fabric is employed rather than the wire as above referred to is because cotton is better able to survive the wiles of flexure; but even this excellent material breaks down in time, the measure of which depends upon the quality of the cotton, its weave and amount of flexure.

* * *

WHEN an automobilist finds that properly inflated tires produce disagreeable vibrations, especially when a car is traveling at a high rate of speed, it is optional with him to reduce the degree of inflation of the tires in order to promote more agreeable conditions of riding, but the life of the tires will be enormously decreased on account of the ills of flexure, whereas the real remedy lies in properly inflating the tires and for the rest it is a mere matter of regulating the speed of the automobile so that disagreeable vibrations may be avoided. There is room for improvement in the making of tires, and those who have the best interest of the automobile art before them are quite as keen in their advocacy of the production of good tires as there is any occasion for.

* * *

LEGISLATION as it relates to the use of the highways by automobilists seems to be of the type that accords with the condition of the automobile art of a decade ago, and it suggests the thought that legislators have failed utterly to keep pace with the growth of this newer industry, which has reached substantially the third place in the leading industries of America, thus bringing into bold relief the glaring inconsistencies of the men whom the States intrust with the framing of the laws relative to the highways and their proper use. The impression is gaining force that some of the legislative methods in vogue are founded upon a type of stupidity that will lead to disaster. Take the State of New Jersey as an illustration. Its citizens freely admit that automobilists generally are among the most intelligent of the nation's makeup. But in the face of this fact the legislative forces in the State of New Jersey have built a wall around that State depriving these intelligent citizens of the right to traverse its highways excepting under conditions that would affront the intelligence of a skate. It is a mere matter of time, of course, when the citizens of New Jersey will awaken to the fact that they are being put to great loss, but it will take a number of years for the State to regain what it is losing through its failure to encourage the principles of reciprocity.

M. C. A. Clears Sporting Skies

Bans Half-Mile Tracks and Sifts Rules

Half-mile dirt track racing was killed; mile track owners were ordered to take precautionary measures to insure safety and supervision of such racing was provided; weight restrictions in stock car race was limited; weight restrictions in stock car classes were raised and truck contest sanctions were restricted to regularly organized automobile clubs by the recommendations of the M. C. A. in its meeting at Detroit last week. Many more legislative changes were considered and discussed.

DETROIT, Aug. 14—A number of radical changes in the rules governing automobile racing were discussed and recommended to the Manufacturers' Contest Association by the executive committee of that body which met here Thursday and Friday. The most prominent of the recommendations are as follows:

Refusal of all sanctions for racing on half-mile dirt tracks.

Mile-track associations to be given sanctions only after safety has been approved by a member of the Contest Board.

The number of starters in any race to be limited to one for every 400 feet of track.

The elimination of the weight restriction in stock car races and the limiting of such events to such cities only as offer a market which may be influenced by the results of the events.

Refusal of truck contest sanctions to any but regularly organized automobile clubs.

In addition a committee was appointed to wait upon the N. A. A. M. at its next meeting, for the purpose of securing from that body financial backing which will enable a more thorough supervision of the sport. Ways and means to this end were discussed though not formally voted upon. Some of the members of the committee were in favor of placing the Contest Board in the position of race promoter while others believed that close supervision of the work of the promoters and the presence of an authorized representative of the Board would be sufficient.

President Howard Marmon of Indianapolis presided over the sessions of the committee which were attended by 15 members, as well as Chairman Butler of the A. A. A. Contest Board, David Beecroft and F. E. Edwards of the technical committee of that body, and George Robertson, president of the Racing Drivers' Association.

It was the unanimous sentiment of the committee that racing on dirt half-mile tracks should be abolished. The committee would also have made a similar recommendation regarding the mile tracks, but for the fact that this would deprive many cities of the sport altogether. Its recommendation in this respect is for a rigid examination of all such tracks before sanctions are granted. Specific recommendations are that the tracks shall be oiled several days before the meeting and that the inner rails shall be lowered to such an extent as not to interfere with the safety of the drivers whose cars shall happen to be diverted to the infield of the course. This was done on the advice of George Robertson, who advanced the theory that a large share of injuries from such accidents were the results of the height of the top boards of such fences. To further insure the carrying out of such safeguards it was recommended that every promotor give bond for $500 that precautions will be taken.

The elimination of the weight restrictions on stock car races was a general surprise, the significance of which is not readily apparent. It was rumored, however, that several companies which were very anxious to have this done, stood ready to not only take an active share in racing but also to lend financial assistance to the Contest Board in its endeavor to secure a firm footing and to guarantee the presence of at least one of its members at every race meeting.

The recommendation regarding the elimination of sanctions to corporations and individuals other than automobile clubs was made to prevent the securing of gratis advertising by such promoters. While truck and delivery wagon contests were particularly mentioned in this connection, the recommendation applies to all sorts of competitions between motor cars.

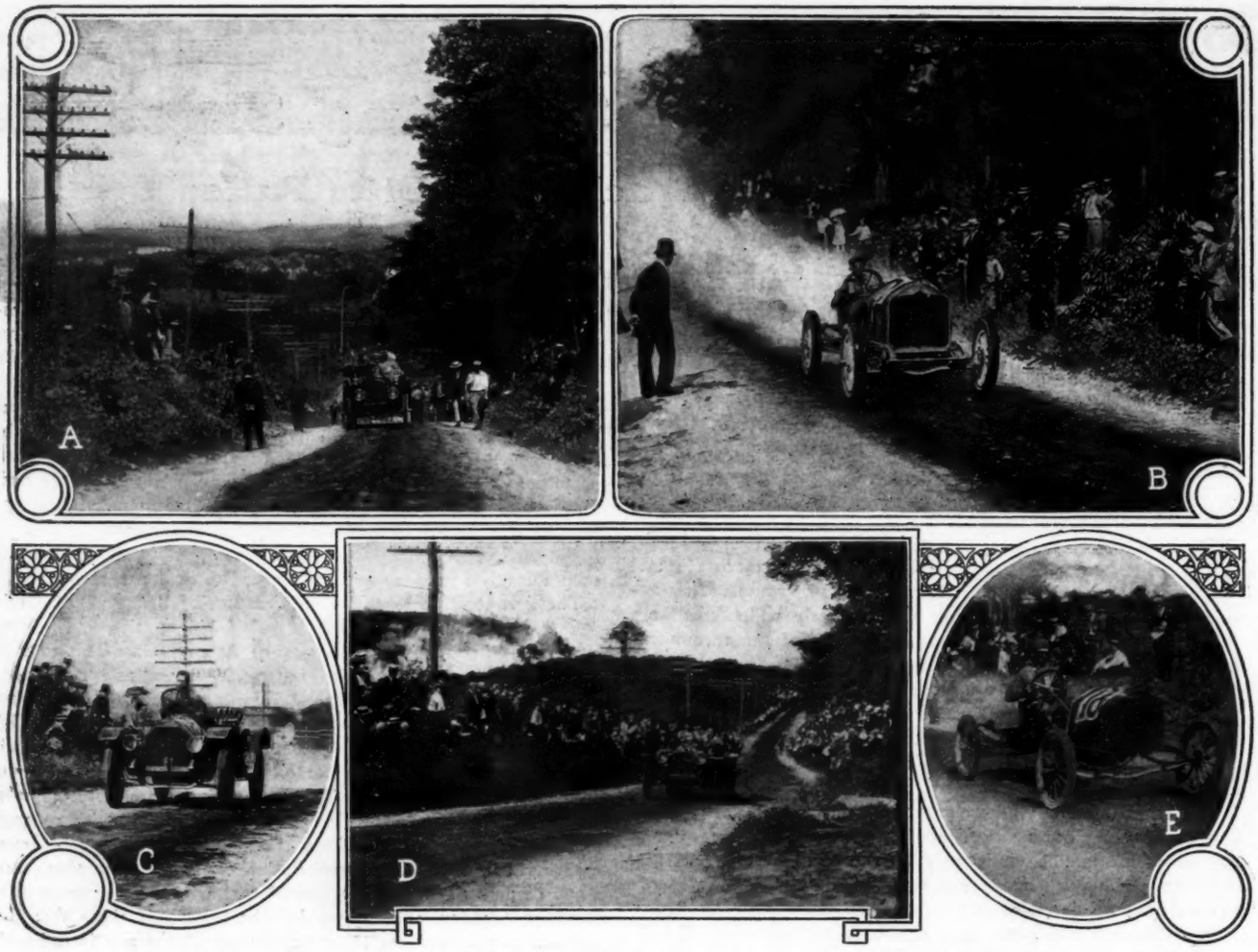
All the recommendations will be presented to the parent association at its meeting in New York, September 6.

The first topic to be taken up was that of the proposed Glidden tour for October which is scheduled to run from New York to Jacksonville, Fla., by way of Atlanta, Ga. This tour is scheduled to be a good roads booster scheme and as such, Chairman S. M. Butler, of the Contest Board, asked that the entering of cars by private owners be simplified by not requiring said cars to be registered. At present it is necessary that stock cars be registered with the contest board before they can compete in any reliability run. There are a few manufacturers who have refused to register their cars this year. They have refused to register them in order keep their dealers and owners from entering contests. Chairman Butler explained that there are many owners of these unregistered cars who wish to enter this southern Glidden, and it was for the benefit of these that the demand to eliminate the stock registration clause was introduced. After continuous discussion it was decided to make no change in the rules so that only registered stock cars will be allowed to compete. Representatives of some makers present frankly admitted that they did not want owners to enter contests and had refrained from having their cars registered in order to prohibit owners entering such.

It was the general consensus of opinion that no change should be made in the present stock car rules. It was a matter of general regret that stock car competition has not been entered into with greater vim by the manufacturers this year. The Elgin races will be practically the only large stock car events of the season. It was resolved that for the 1912 season a contest committee be asked to sanction twelve stock car events in which its technical committee will attend. These events are to be scattered through the greatest market sections of the country.

It was the unanimous opinion of the many delegates that additional precautions be taken in the matter of roadway, beach and track races. It was accordingly recognized that in all speed contests a mechanic must ride with the driver. This also applies to practice for road races or track meets.

Among those representatives attending the meeting were: Howard Coffin, Hudson Motor Car Co.; Howard Marmon, Nordyke & Marmon Co.; S. M. Butler, Chairman Contest Board A. A. A.; F. E. Edwards, Chairman Technical Committee A. A. A.; C. E. Emise, Lozier Motor Car Co.; M. C. Meigs, J. I. Case Threshing Machine Co.; N. A. Hawkins, Ford Motor Car Co.; J. H. Newmark, Oakland Motor Car Co.; Mortimer Reeves, United States Motors Co.; A. W. Markham, Mais Motor Truck Co.; E. W. Curtis, Electric Vehicle Association of America; Elmer Pratt, Pierce-Arrow Motor Car Co.; George H. Robertson, President Racing Drivers' Association, and Russell Field, secretary, Manufacturers' Contest Association.



A—View from the top of Dead Horse Hill, showing one of the stiff grades to be negotiated

B—National, No. 2, Wilcox, driver, which captured four races and lowered the record for gasoline cars

C—Oakland, No. 15, Bauer, driver, winner of the $801-$1200 stock class

D—Velie, No. 9, Wiggins, driver, winning the 4A race for $1601-$2000 stock cars

E—Flanders, No. 18, Witt, driver, which landed the 1B class race

Success Crowns Dead Horse Climb

Biggest Eastern Event of Season Is Held

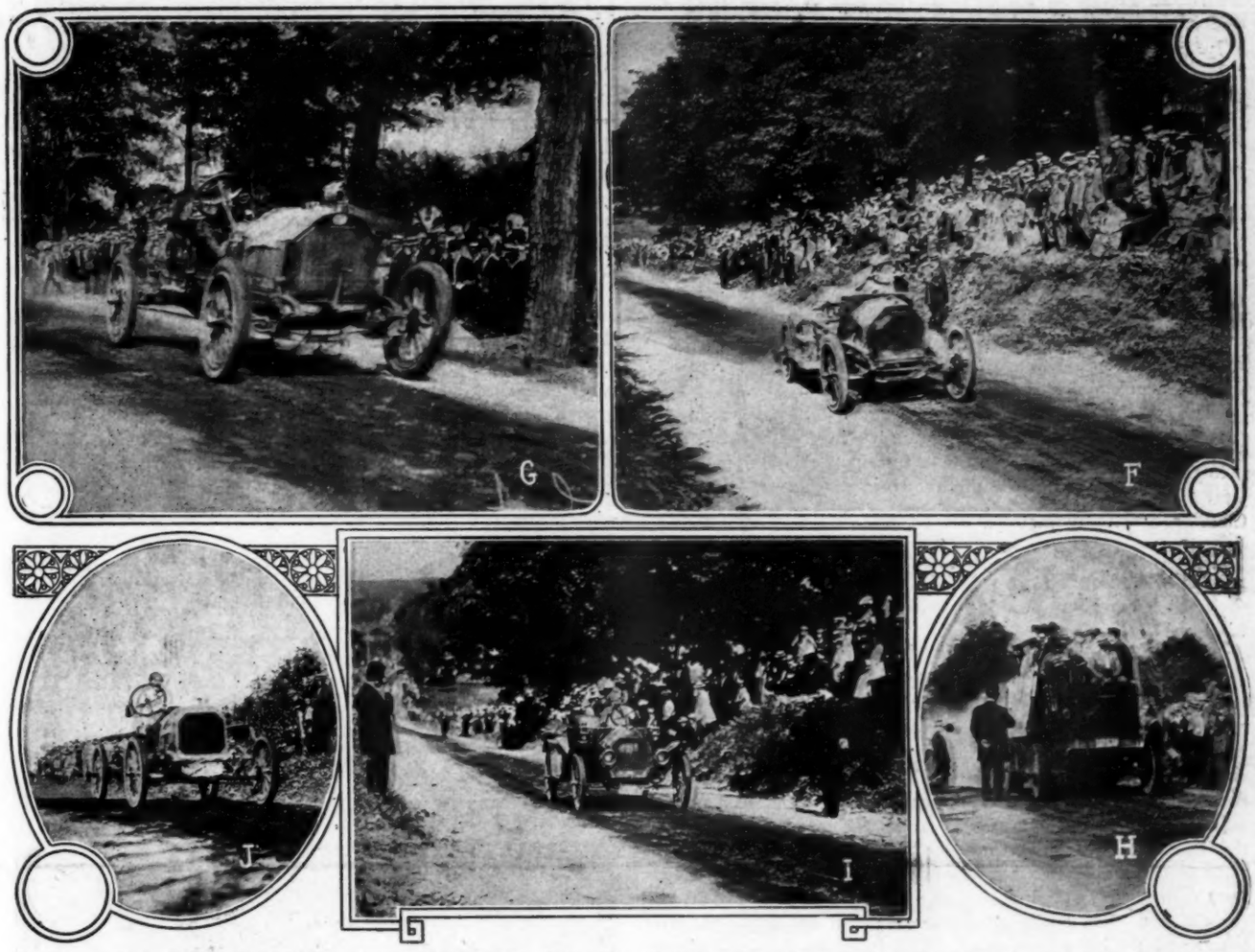
Thirty-four cars, representing the stock models of sixteen makes of American automobiles contested for hill-climbing honors at the sixth annual renewal of the Dead Horse Hill Climb under the auspices of the Worcester Automobile Club, Saturday. The cars representing the National, Cole, and Oakland factories won every event in which they were entered and a special National won four races, and in addition thrice lowered the record of the hill for gasoline cars. There were eighteen races decided.

WORCESTER, MASS., August 14—Dead Horse Hill was mounted sixty-one times during the sixth annual hill-climbing contest under the auspices of the Worcester Automobile Club on Saturday afternoon.

Records were lowered all around and a new mark for gasoline cars on the course was set. The three-year-old record of the hill, made by a Stanley steam car (Baldwin) at 54 seconds flat was not quite reached. A four-cylinder National with the regular stock diameter of cylinder but with a stroke elongated to 7 1-2 inches and rated at 50-horsepower swept the boards in the free-for-all classes. Four times this car started with a factory driver at the wheel and four times the officials announced that it had won. Each of these events developed the hottest sort of a contest, for the big brown Knox car that made such a creditable showing at Indianapolis on the occasion of the late 500-mile international sweepstakes, pushed out the blue car to its speed limit and in the final event for the hill record, came within a second of defeating the National.

The Stanleys which were entered in the big car events did not equal the work of the former season when they made the speed record.

The contest was far and away the most important in a sporting sense that has been held in the East this season so far, and far exceeded any of the former climbs that have been held on Dead Horse Hill.



G—Cole, Jenkins, driver, which won two races in fast time in stock and non-stock classes

F—Showing how the spectators massed on the natural grandstand formed by the side of the hill

J—Buick, No. 13, which won the 161-230 cubic inch class race

I—Krit, No. 24, Pilling, driver, winner of the 1A race—$800-and-under class

H—The Gramm five-ton truck negotiated the hill with a full load

There were thirty-two starters in the various events not reckoning ten motorcycles which competed for two prizes. One of these, an Indian number 34, ridden by Frank Hart, lowered the record of the hill for this type of vehicle by making the climb in 54.60 seconds.

There was a tremendous crowd out to see the races and the club handled it in such a way that it probably made a handsome profit out of the affair. The lower end of the course was boarded in and admission to the side hills was charged. Of course everybody who saw the contests did not pay, but a fine percentage of them had to. Then, too, the prizes in the various classes consisted largely of certificates issued by the club showing the performance of the cars.

A more perfect day for the climb could hardly have been made to order. It was warm when the sun shone but the sky was partly overcast and the temperature delightful. The course was not smooth and despite its preparation for the climb was dusty. The running of the numerous trials was done accurately and promptly and the whole affair reflects much credit upon the club.

Sure enough stock cars competed in their various classes and gave a comparative exhibition of their prowess and powers in competition with similar cars which is expected to do much toward stimulating business. Every entry in Classes A and B which include respectively, equipped automobiles according to price classification, and stripped stock chassis, were examined and checked over by A. F. Camacho as technical representative of the Contest Board. On Friday night Mr. Camacho was informed that there might be a protest lodged against the Cole pair entered in their stock chassis class and he pulled down the cars, measuring the cylinders and other questioned parts. No difference was discovered between the cars entered and the certified stock models and they were allowed to start. There was also some question raised as to the eligibility of two of the Buicks entered, but it was shown that neither of the cars was a model of the current year and the protest was squelched in its incipiency. All the other cars in Classes A and B were not questioned, but checked up with the certificates.

The timing was done with an electrical instrument, the property of the Worcester Polytechnic Institute and was supervised by Professor David L. Gallup and a corps of assistants from the college. The instrument wrote the record of each climb in an unmistakable way and while the seconds were only divided into twentieths in the announced figures, the hundredths or even more minute decimal fractions could be determined by using a magnifying glass on the tape, if such a course proved necessary in order to differentiate a winner in case of a very close finish. This occasion did not arise during the afternoon.

The first number on the program was for stock cars selling for $800 and less and the only entry to qualify was a Krit. The next larger class was won by an Oakland runabout which defeated a Cameron. The class selling from $1,201 to $1,600 was captured by a bigger Oakland from a New Parry. In the 4A event for cars selling as high as $2,000, Velie number 9 won handily from a Buick (38) and another Velie, while 5A went to a National (40) entered by the Poertner company of New

York and driven by Rutherford. Another National stock car and a Knox (4) finished close up.

In the stripped chassis classes, the smallest class open to cars of less than 160 cubic inches piston displacement was won by a Flanders 20 in the astonishingly fast time of 1:18.85. An Empire was second. Hudson 16, a 20-horsepower car had a walkover in the 161-230 cubic inches class and the 231-300 class race was won by Cole 22 in 1:17.55, with Firestone-Columbus second and another Cole in third place.

Class 4B for cars of 301-450 cubic inches developed one of the prettiest struggles of the day and attracted a field of eight fast cars. The winner turned up in National 1 (Wilcox) who mounted the three hills in 1:00.35, lowering the record for this class. The same may also be said for the foregoing performances of the Flanders in 1B and the Cole in 3B. National 5 was a fair second and National 3 a close third. Another National, a Velie, Knox and two Buicks also ran.

Class 5B for cars from 451 to 600 cubic inches piston displacement was won by Knox 6 (Coffey) in 1:03.60.

In the non-stock sections in which most of the competing cars were in reality stock cars, the showing was also excellent. In Class 2C which corresponds with 2B except for weight restriction, Buick (10) had a walkover.

In Class 3C for cars of 231-300 inches displacement, the Cole pair finished first and second, the winner, number 22 turning the trick in 1:16.75. The third place was taken by the Cameron Six.

Class 4C brought out a field of six including three Nationals, a Knox and two Buicks. The finish was in that order, the winner, number 1 National (Wilcox), making the run in 1:01.70.

The 5C class for big cars saw the hill-record for gasoline cars lowered a peg and later in the afternoon it was twice brought down from the new level. National 2, a 50-horse-power machine and said to be a duplicate of the cars that raced at Indianapolis on Decoration Day and of the car that cleaned the boards at the Galveston beach meeting this month, won first honors in 55.70 seconds, over two seconds faster than was made by a Fiat (90) (Bragg), last year over the same course. At that, the car did not get a really good start and did not make the first quarter of the hill at top speed. The Indianapolis Knox almost equalled the time of the Fiat and was credited with 58.80 seconds. Another Knox was third.

Then came the free-for-all events. The first of these was for any kind of an automobile and National 2 (Wilcox) made the ascent in 0:55.50, again lowering the record of the hill. The big Knox was second, two seconds slower and a Stanley Steamer was third, nine seconds after the Knox.

The second race in this class was for the Amateur Championship of Worcester County. The trophy for this race had already been won twice by a Stanley steamer guided by Jay Clark, Jr., and Mr. Clark foreclosed his option on the cup by driving his car leisurely up the hill in 1:15.75 for a walkover victory.

K—Worcester's bluecoats marching up the hill to their stations

The third race was for D class gasoline cars and National 2 again triumphed over the Knox pair.

The final event which was open to anything in the automobile line, for the record of the hill, witnessed another slash at the new mark when National 2 clipped 1-20 of a second from its recently established mark and set the new target for aspiring hill climbers at 55.45 seconds. The big Knox was within a second of the winner's time.

The hill record would have been materially lowered in this event except for an unfortunate occurrence near the finishing line. Wilcox at the wheel of the big car got away to a magnificent start, taking the little bridge just beyond the trip wire with his throttle wide open. Up the first grade, a stiff climb averaging rather more than 8 degrees and infinitely stiffer than the figures apparently show, the car plunged, making a new mark for the quarter distance. Along the little flat bench of perhaps 100 feet the car shot with dazzling speed and entered the 12 degree hill on high gear with the driver's foot hard on the accelerator. The fierce energy of the motor raised clouds of dust under the traction wheels and like a bird the big car mounted the grade that numbers its slain horses by the hundreds. At the top there is another little bench and then a sharp, long grade, the heaviest spot in which is over 20 degrees. Across this flat and charging at the foot of the hill the car began its upward flight to the wire at a terrific rate of speed.

Everybody at the crest of the hill and around the timing apparatus station was tensely awaiting the flash of the monster automobile when a touring car slipping out of its parking space just at the brow of the hill came dashing along toward the wire. The car reached the wire just as Wilcox began to mount the third hill and tripped the machine as the National's exhaust gave warning of its approach under full power. An assistant of Professor Gallup seized the wire and slipped it over its hook again a fraction of a second before the front wheels of the racer struck the

L—General view at the foot of Dead Horse Hill, where the contestants lined up

wire. The National probably lost two full seconds between the crest of the hill and the wire on account of its proximity to the touring car as Wilcox took his foot from the accelerator and even closed his throttle in order to avoid a rear-end collision with the intruder. He did not apply his brakes and by some quick-witted driving missed a bad mess with the other automobile. Except for this happening there was nothing disagreeable about the afternoon's sport, but the car was surely robbed of the honor of establishing a mark lower than that of the Stanley Steamer.

Knox No. 7, the big car driven by Belcher also lowered the last year mark of the Fiat, in this event turning the course in 56.30 seconds. This is 85-100 of a second slower than the winner, but 1.70 seconds faster than the Fiat's time.

The policing arrangements for the event were not of the highest class, as the number of men detailed proved insufficient to handle the crowd, and along toward the end of the card when the big cars were contesting the course was not clear at all times.

One thing that aggravated this condition was the injection of the truck exhibitions between the races. First a Cameron delivery car went up in 2:00.05 and then a fully loaded Gramm truck of five tons capacity made the climb. This car covered the course in 6:25.25 and when it passed many of the spectators thought the last race was finished and swarmed out upon the course. As the big cars were slated to try for the record of the hill after the trucks had passed, the situation was acute for a few minutes. Fortunately there was no accident except that which deprived the National of the absolute record for all classes of automobiles. The summary:

1-A—Stock Cars for $800 and Under

No.	Car.	Driver.	Time
24	Krit	Pilling	2:10

2-A—Stock Cars Selling at $801 to $1,200

15	Oakland	Bauer	1:50.15
21	Cameron	White	3:57.55

View from the grandstand at the automobile beach carnival at Long Branch

3-A—Stock Cars Selling at $1,201 to $1,600

14	Oakland	Bauer	1:37.10
26	New Parry	Wiggin	1:47.85

4-A—Stock Cars Selling at $1,601 to $2,000

9	Velie	Wiggins	1:21.15
12	Buick	Jessup	1:36.60
10	Velie	Wallace	1:48.95

5-A—Stock Cars Selling at $2,001 to $3,000

5	National	Rutherford	1:04.30
8	Knox (4)	Coffey	1:08.15
4	National	Pugh	1:11

1-B—Stock Chassis Under 160 Cubic Inches, Minimum Weight 900 Pounds

18	Flanders	Witt	1:18.85
17	Empire	Kaeser	1:55.10

2-B—Stock Chassis 161-230 Cubic Inches, Minimum Weight 1,200 Pounds

16	Hudson (20)	Johnson	1:47.50

3-B—Stock Chassis 231-300 Cubic Inches, Minimum Weight 1,500 Pounds

22	Cole	Jenkins	1:17.55
25	Firestone-Cols	Peard	1:24:25
23	Cole	Habich	1:29.60

4-B—Stock Chassis 301-450 Cubic Inches, Minimum Weight 1,800 Pounds

1	National	Wilcox	1:00:35
5	National	Rutherford	1:03:45
3	National	Randall	1:05.45
8	Knox (4)	Belcher	1:05.80
11	Buick	Jessup	1:09.25
4	National	Pugh	1:12.70
9	Velie	Cole	1:14.75
10	Buick	Wallace	1:15.70

5-B—Stock Chassis 451-600 Cubic Inches, Minimum Weight 2,100 Pounds

6	Knox	Coffey	1:03.60

2-C—for 161-230 Cubic Inches, Cars No Weight Restrictions

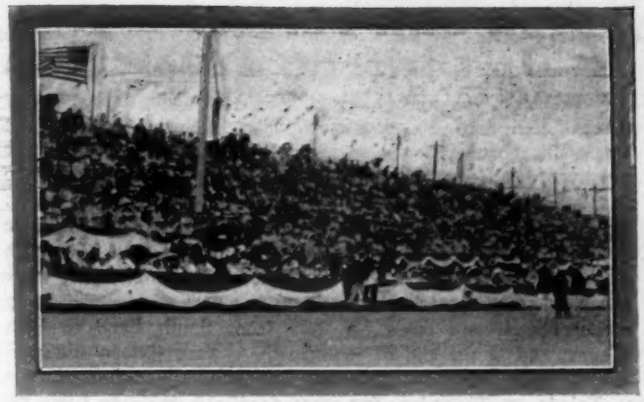
13	Buick (10)	Hooker	1:29.40

3-C—for 231-300 Cubic Inches, Cars No Weight Restrictions

22	Cole	Jenkins	1:16.75
23	Cole	Habich	1:20.95
19	Cameron (6)	White	1:43:20

4-C—for 301-450 Cubic Inches, Cars No Weight Restrictions

1	National	Wilcox	1:01:70
3	National	Randall	1:02 80
5	National	Rutherford	1:03.35
8	Knox (4)	Coffey	1:06.85
11	Buick	Jessup	1:14.20
10	Buick	Wallace	1:17.95



A portion of the big crowd which witnessed the events at the Long Branch carnival

5-C—for 451-600 Cubic Inches, Cars No Weight Restrictions

2	National (50)	Wilcox	55.70
7	Knox (6)	Belcher	58.80
6	Knox (6)	Coffey	1:07.15

1-D— Free-for-All

2	National (50)	Wilcox	55.50
7	Knox (6)	Belcher	57.65
27	Stanley Steam	Walsh	1:06.85

2-D—Worcester County Amateur Championship

29	Stanley Steam	Clark	1:15.75

3-D—Free-for-All Gasoline Only

2	National (50)	Wilcox	55.70
7	Knox (6)	Belcher	56.90
6	Knox (6)	Coffey	1:00.70

4-D—Free-for-All Record of the Hill

2	National (50)	Wilcox	55.45
7	Knox (6)	Belcher	56.30
28	Stanley Steamer	Clark	1:02.40
6	Knox	Coffey	1:03.20

Long Branch Parades

Decorated automobiles paraded Saturday at Long Branch as the culminating feature of the midsummer carnival conducted annually at that resort. Automobiles were used to a much greater extent this year in the festival than ever before in the history of the institution.

LONG BRANCH, N. J., Aug. 14—An automobile parade was one of the big features of the closing day of the third annual midsummer carnival held here under the auspices of the Long Branch Board of Trade, on Saturday. Automobiles were used in the festivities to a much greater extent this year than ever before and proved to be a prime factor in each succeeding stage of the program.

During the boardwalk exercises, hundreds of cars were used to convey sightseers and when the baby parade was in progress, the procession of pretty children and their prettier mammas and nurses was reviewed from the vantage ground afforded by the parked cars.

Saturday afternoon was the culminating point in the festival and the parade of automobiles, some of them fearfully and wonderfully decorated, was the big number of the program.

At the conclusion of the parade the judges announced that the first prize for the best decorated private automobile had been awarded to Mrs. John H. Parker. The prize for original design was won by M. G. Kahn, Gimbel Brothers, Park and Tilford, Leo Metzger and Adolph Graf were other winners in the competition.

Remy Brassard Successfully Defended

BALTIMORE, Aug. 14—The Remy grand prize and brassard were successfully defended by Benz (Burman) at Electric Park Saturday on the half-mile track. The other races were won by Kline (2), Abbott-Detroit (1) and Mercedes (1).

Seven Still Perfect In Chicago Truck Run

KALAMAZOO, MICH., Aug. 15—After eight day's running the Chicago *American's* commercial vehicle reliability test from Chicago to Detroit and return there are only seven of the twenty-five starters left with perfect scores. The survivors to date are the No. 6, Hewitt; 23, Lemoon; 32, Federal; 16, Kelly; 13, Mais, and Nos. 10 and 11, Buick. The three Gramms have not been figured up as yet on to-day's run, but they have been out of the perfect score class for several days. The past week has seen some remarkable work on the part of the contesting cars. The second day's run was from South Bend to Fort Wayne, and at the end of the trip there were sixteen still perfect. There were three penalized on the run from Fort Wayne to Toledo on Thursday, five were penalized going to Lima on Friday, while Detroit was the destination on Saturday, a stop being made there over Sunday. The run from Detroit to Jackson on Monday was comparatively easy, with only one penalization. To-day, however, the run from this city resulted in seven penalizations. So far there has been only one withdrawal, the No. 9 Poss being withdrawn the end of the third day, a cracked cylinder jacket being the main difficulty. As the score stood to-night it was as follows: No. 9, Poss, out; No. 24, Lincoln, 4 points; No. 37, Vandike, 13; No. 6, Hewitt, perfect; No. 20, Bauter Jurgens, 7; No. 30, Owosso, 22; No. 38, Clark, 68; No. 39, Ideal, 7; No. 34, Chase, 4; No. 1, Gramm, 1492; No. 23, Lemoon, perfect; No. 38, Stephenson, 62; No. 32, Federal, perfect; No. 2, Gramm, not figured; No. 16, Kelly, perfect; No. 13, Mais, perfect; No. 3, Gramm, not figured; No. 14, Dayton, 30; No. 17, Kelly, 3; No. 4, Gramm, not figured; No. 10, Buick, perfect; No. 11, Buick, perfect; No. 27, Kretworth, 21; No. 31, Chicago Pneumatic, 26; No. 33, Chase, 6; No. 5, Modern, 26.

Four Road Races at Cincinnati

CINCINNATI, Aug. 14—The course selected for the Fern Bank dam road races is 7 7-10 miles in length with Cooper avenue, Blue Ash road, Montgomery Pike and Reading road making the four sides of a quadrangle. The committee has contracted for the erection of a grand stand located 12 miles from the city on Blue Ash road to seat 20,000.

The Interurban company will give the use of its car barns and machine shops at Silverton in near proximity to the course for two weeks prior to the races, insuring comfortable quarters and all necessary conveniences for repair work. The numerous crossings are to be well guarded and car service to and from the points of view will be ample.

The most valuable prize announced thus far is by The Cincinnati Automobile Club; it will be of not less than $1,000. Four races, 125, 150, 180 and 250 miles, will be run.

Where the entrants in the Chicago truck were parked overnight in Lima, Ohio

Columbus to See 200-Mile Race

COLUMBUS, O., Aug. 14—Arrangements have been completed by the Columbus Automobile Club, of Columbus, Ohio, for a 200-mile sweepstake race to be run on the Columbus Driving Park track September 3. At first the club was figuring on a number of different events for its 1911 race meeting, but after consideration it was decided to have the 200-mile contest. The contest will be a sweepstake with a purse of $1,000 to the winners in addition to $1,500 in trophies.

The race will be limited to cars having 600 or less cubic inches and the drivers who participate must reside in the State of Ohio. A sanction has been secured from the Contest Board and the representative is Mr. Grimes, of Cleveland. It is the purpose to make the meet a popular affair and an admission fee of only 50 cents will be charged. It is expected that at least 25 cars will start in the big race.

At the Contest Board the information was given that the Columbus sanction would be granted providing the track was adequately protected according to the rules.

Premier Caravan Finishes Tour

LOS ANGELES, CAL., Aug. 14—Still intact, the Premier caravan consisting of ten touring cars and two official automobiles rolled into Los Angeles last week and completed its long journey from Atlantic City, N. J. The ceremonies were finished when the front wheels of the dozen cars were driven into the Pacific ocean.

Scene in Cadillac Square, Detroit, where the Chicago truck run stopped overnight

The whole trip has been accomplished, according to those who took part in it, without resorting to anything but the power of their own motors. The schedule arranged for the tour was something in excess of 150 miles a day and the start and finish were on schedule time.

St. Louis Tour Starts West

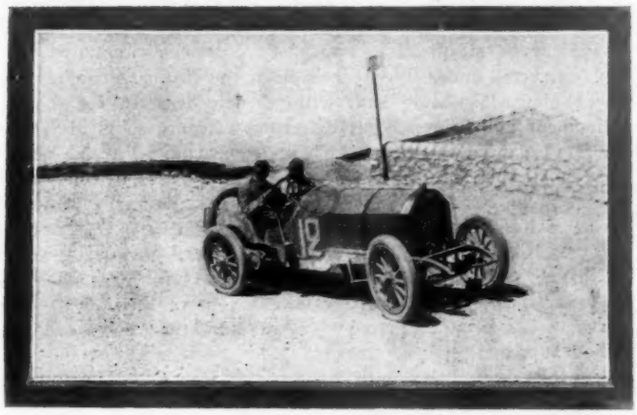
ST. LOUIS, Aug. 14—Thirteen contestants, three official cars and one non-contestant left St. Louis early Monday morning on the Manufacturers 'and Dealers' Reliability Run to Kansas City. At the time of the start it was said in St. Louis that the Kansas City motorists who had been announced to make the return trip with the St. Louisans had abandoned the plan, and the contest will be entirely a local affair. The tourists expected to arrive at Moberly Monday night, by way of Mexico and Columbia. The cars taking part are: Interstate, Dorris, Mitchell, Marmon, Ford, Ford, Ohio, Buick, Cadillac, New Parry, Flanders, Flanders, Hudson, American Traveler, Amplex, Marion and Ford.

The cars were given a rousing send off despite the smallness of the procession and at every town along the route delegations of automobile enthusiasts met the tourists and escorted them through town. Good weather was encountered and the roads were fair.

Mont-Ventoux Hill Climb

The annual French automobile classic which is held on Mont-Ventoux was a greater success this year than on any previous occasion. Several of the cars that had taken part in the recent light-car race vied with each other for fresh honors.

BEDOIN, Aug. 6—The hill which starts from here is an ideal one for a race, as it is possible from the plateau at the top to witness the cars making the arduous climb practically for the whole length of their course. Although the record for the hill was not beaten, nevertheless the time made by Deydier on the Cottin-Desgouttes was very fast. This car took part in the Grand Prix de France and it is to be regretted that the driver did not have more opportunity to study the hill as some precious time was lost on several of the turns. The Ford car, shown in the illustration, having been put in order after its accident at Le Mans, finished first in its class and second in the general classification, finishing slightly under three minutes slower than the winner. The Lion-Peugeot cars driven by the veteran pilots Goux and Boillot finished first, each in their respective classes. Gaste driving a Rossel car, who won most of the races held in the South of France last year, including the Salon meet, was unable to make good time owing to the lightness of the rear portion of the car; oftentimes the wheels spun round while the car remained stationary. The Bugatti despite a broken front spring and a burst tire managed to climb the



The winner of the Mont-Ventoux hill climb, a Cottin-Desgouttes, driven by Deydier

hill in 30 minutes, 55 seconds. The meeting was organized by the Automobile-Club Vauclusien and the arrangements were carried out without a hitch. The following are the list and times of the winning cars.

Car.	Driver.	Time.
	Sixth Class (2)	
Rossel	Gaste	23 m 34 s
	Sixth Class (1)	
Cottin-Desgouttes	Deydier	19 m 45⅘ s
	Fourth Class	
Ford	Depasse	22 m 19⅘ s
	Third Class	
Lion Peugeot	Boillot	23 m 30⅘ s
Aquila Italiana	Narzaglia	28 m 17 s
Lancia	Tangazzi	30 m 21 s
Pilain	Fournier	30 m 38 s
	Second Class (2)	
Bugatti	De Vizcays	30 m 55 s
	Second Class (1)	
Lion Peugeot	Goux	25 m 3⅘ s

Lebanon Road Temporarily Closed

Owing to new road construction under way on the east side of Lebanon mountain, on the main route between Albany and Pittsfield, the Massachusetts Highway Commission has decided to close the road for several weeks.

State Officials to Inspect Roads

One of the most important conferences in the interest of highway improvement that has ever taken place in the East, will be held within the next fortnight, when the highway officials of New York, Massachusetts and Connecticut will make a tour of inspection over some of the more important roads of their respective States.

The details for this conference are now being arranged by the Touring Club of America. The New York delegation will meet at Albany and from that point the motor tour will be made to Pittsfield and thence to Springfield, Mass., where the general conference will be held.

Hupp Sells Stock in Motor Company

DETROIT, MICH., Aug. 15—Robert C. Hupp, president of the Hupp Motor Car Company, of which he was also organizer, yesterday disposed of his stock to a number of the present officers of the company and will on September 1, cease all connections with it.

Until that date he will retain his offices of president and general manager, although practically all of his time will be devoted to the affairs of the Hupp Corporation, a collection of manufacturing plants in Fairview east of Detroit.

Mr. Hupp's retirement from the affairs of the Motor Car Company has been rumored for some time but has been categorically denied by both himself and by the officers of the company.

Local gossip is now busy with the future plans of the Hupp Corporation. It is freely rumored that it will soon add to its products a gasoline car of light type, on lines somewhat similar to those of the Hupmobile. Mr. Hupp refuses to discuss this matter aside from authorizing the statement that the Hupp Corporation is now fully equipped to build any sort of automobile product. Prior to his organization of the Hupp Motor Car Company, which has been a marked financial success, Mr. Hupp was connected with the Oldsmobile Company, both at Detroit and Lansing.

Briscoe Predicts 210,000 Cars for 1912

Benjamin Briscoe, president of the United States Motor Company, has declared in an authorized interview that the production of passenger automobiles in 1912 will in his opinion reach the record-breaking total of 210,000 cars. He states that he believes that fully 60 per cent. of this number, or 126,000, will be required to fill the demands of physicians, contractors, salesmen, etc., who use their automobiles in business and pleasure.

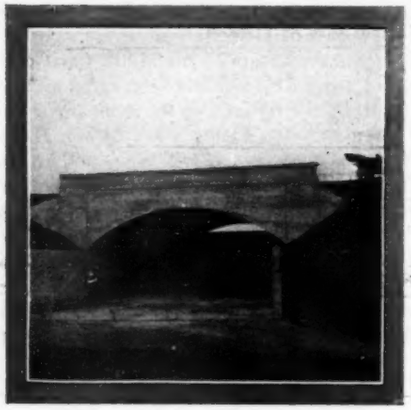
Mr. Briscoe estimates that the average cost will be reduced from $1,533, where it stood last year, to about $1,100. This would indicate a largely increased production of cars selling under $1,000. In his figures Mr. Briscoe does not include trucks.

Depasse rounding the hairpin bend in a Ford car in the Mont-Ventoux hill climb

Oklahoma City Shows the Way

Cow Town Is Building Vast Park Speedway

America's newest metropolis, Oklahoma City, is completing a speedway boulevard project that makes anything else of its kind in the world look like a counterfeit. The course is almost finished and when the last touch has been added the course will be twenty-six miles long, surrounding the city with a ninety-foot speedway without a single grade crossing, smooth as to surface and absolutely protected throughout its length. Already plans are being made to run off some of the motor classics on the new course before cold weather sets in.



Side view of one of the arches over a "fill"

OKLAHOMA CITY, OKLA., Aug. 14—Oklahoma City is spending a half million dollars in constructing an automobile boulevard, approximately 26 miles in length, and a system of public parks. Plans are being discussed by the local and State automobile associations for holding races which will attract the attention of the speed demons from all parts of the country, because of the excellent opportunities offered on the course for smashing records.

The route of the boulevard circles the city in a rectangular manner, 6 miles to the side, with half-mile curves at the corners. The heaviest grade is approximately 3 per cent. for a distance of a little more than 900 feet. All grade crossings have been eliminated by subways and the ravines through the parks are bridged with concrete arches.

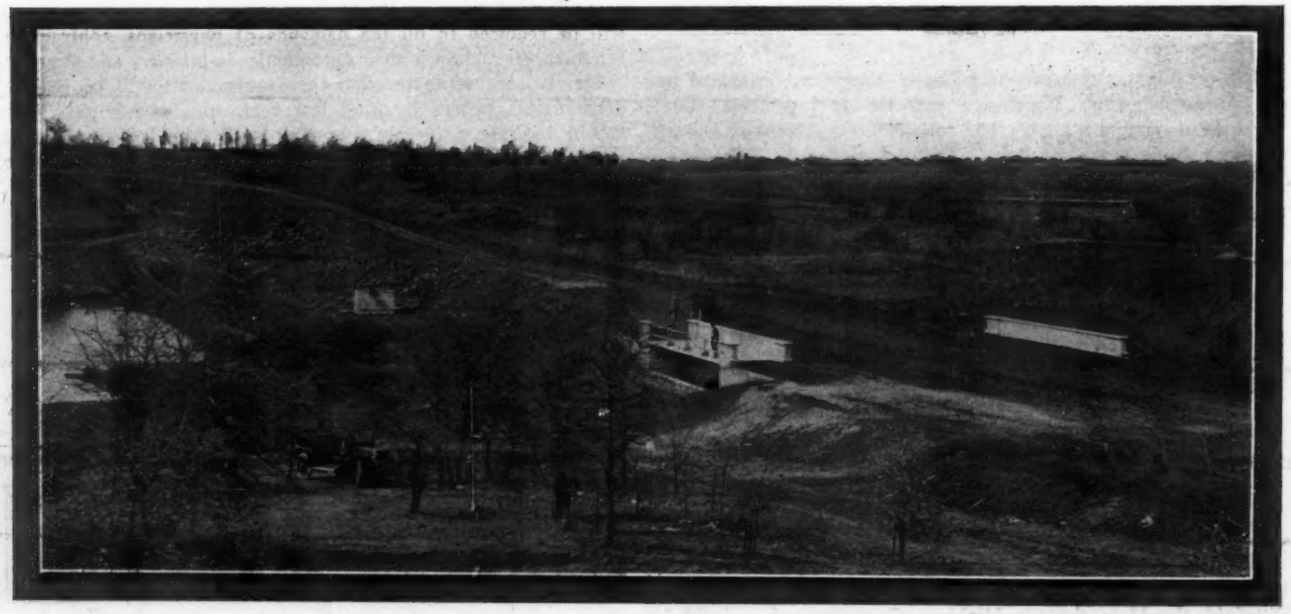
The speedway proper is 90 feet wide. On either side are driveways for carriages. At different places these cross and recross to opposite sides of the track by subways. At no place do they cross a grade, thus eliminating the possibility of the fatalities of road races.

Twenty-one miles of the main drive have been completed, so far as grading, construction of bridges and elimination of sharp curves are concerned. The remaining portion of the track is being held up pending adjustment of little details as to the right-of-way through a school-land section. The dust is to be laid and packed with oil.

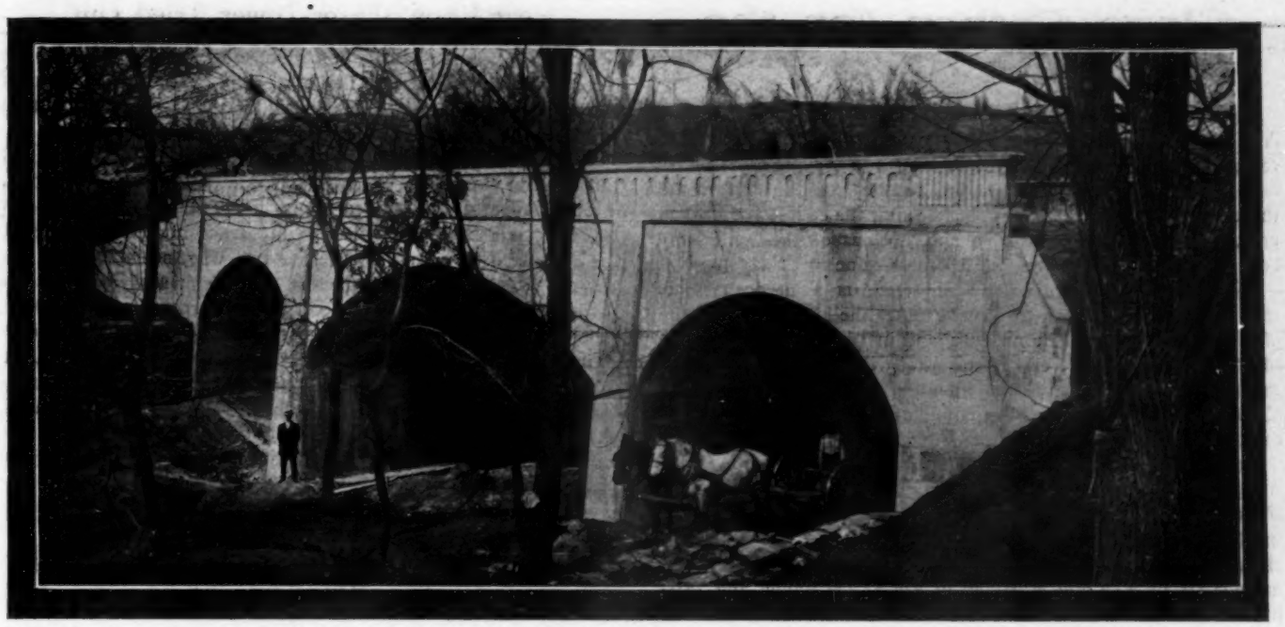
When completed the track is expected to be one of the fastest and least dangerous of the inland race courses, combining the possibilities of the straightaway and the road race course with sharp curves, steep grades and grade crossings eliminated.

Constructed under the supervision of the city park commission, the boulevard is being built with all consideration for the development and bringing out of nature's beauty spots along the route. Four large park tracts have been acquired at the northeast, northwest, southeast and southwest corners of the boulevard system, consisting of approximately 1,600 acres. A lake of 60 acres has been created at the northeast park. A second of 70 acres is to be built at the southeast corner. Property owners at various points have donated smaller tracts for park purposes at various times until the city now has more than twenty-five parks with a total estimated value of more than $1,750,000, obtained at a total cost of $209,319.17.

A preliminary bond issue of $400,000 was voted in 1909 to



View of the 26-mile automobile speedway at Oklahoma City. All grade crossings have been eliminated and one 3 per cent. incline is the steepest



Triple-arched bridges span the streams and form subways for carriage driveways at the right and left

begin the work. Property adjacent to parks, valued at $500,000, is now held by the commission, and is ready for the real estate market, all of which was obtained by donations and financiering by the board in the purchase of the property for the right-of-way. The value of the land obtained as a side issue to the proposition has more than paid for the first series of bonds.

One of the most beautiful parts of the course is the portion passing through the northeast park. It passes over the dam in a roadway 40 feet wide. The dam is 1,100 feet long and 44 feet high. The spillway is 40 feet wide, covered by a reinforced concrete arch. The driveway is 60 feet wide between the balustrades, accommodating both the auto course and one carriage driveway.

On the north line is an unique structure consisting of a 5-foot culvert over which is constructed a 20-foot bridge or subway, the design being intended to allow the ordinary drainage to pass through the culvert and the heavy floods to flow through the 20-foot bridge. The bridge also serves as a connecting driveway between the two carriageways under the auto course. Just east of this combination bridge and culvert is another curious bit of construction work. The speedway passes over a deep ravine, just above a rocky waterfall. A concrete slab was constructed from one bank to another so that there is apparently no bridge. On one side is the effect of a shallow valley and a 50-foot ravine on the other.

The greatest opposition met by the commission in obtaining the right-of-way was from school-land lessees. They opposed the boulevard, giving as their reason that it would enhance the value of the land very materially, thus causing them to pay more for it when it is placed on the market. Appeal was made to the Legislature for relief and it responded by authorizing the sale of the school sections adjacent to the city property.

Contracts for the first grading were let in February, 1910, when work was started on 12 miles of the speedway. Dedication of the opening of the first 17 miles completed was marked by an automobile parade of more than 200 machines. Diagonal boulevards extending from the central portion of the city to the outer or Grand Boulevard are to be constructed. The routes outlined for these as well as practically all parts of the speedway afford a splendid view of the city.

The four sides of the boulevard are distant from the present business center substantially 3 1-2 miles to the north and 3 miles to the east, south and west. The circumscribed territory (about 46 square miles) will accommodate only 184,000 persons, figuring on a basis of 4,000 inhabitants per square mile; so it will appear that Oklahoma City is making a wise move in obtaining these valuable bits of land for the speedway and park and parkway purposes while it has a population of only 65,000 and is still the largest city in the State.

Wisconsin Adopts State Aid

MILWAUKEE, Aug. 14—"The knell of the road working picnic has been tolled. We have passed the day when the working out system of road taxes is advisable or feasible. Wisconsin has joined the ranks of the progressive States which have by systematic work produced admirable systems of highways."

In these words John A. Hazelwood, of Jefferson, Wis., former State Senator and chairman of the Wisconsin Highway Commission, created by the 1911 Legislature, sounded the keynote of the board's future activities in an address before the Dodge County Board of Supervisors at Juneau, Wis., last week. It was the first public statement by a member of the commission and formally introduced State aid for highway construction.

Acting under the new law appropriating $350,000 each year to counties which expend an amount equal to their respective apportionments, the Dodge County board has already started a constructive program, being one of the first counties to take advantage of the new act.

"This State has practically stood still in the matter of building permanent highways," said Mr. Hazelwood. "On the other hand, 75 per cent. of the States of the Union have made marked progress. Central governments all over the world have generally employed the policy of State or Government aid. Most States have adopted some form of a State aid policy. For liberality we have been far outdone in Wisconsin by Minnesota on the start. Money invested in improvement of highways is like 'casting bread upon the waters.'

"One of the most pleasing features of the new Wisconsin act is that it provides a fine example of the initiative. It is up to townships or public-spirited citizens to ask for road improvement. And to those that ask will be given."

Up to this time roads have been built in a haphazard manner. A farmer could work out his poll tax by putting in one day on the highway. One or two farmers went on the road with teams and did more damage than good. All of this work is now stopped and a systematic program substituted.

Clans Gather for the Elgin Races

CHICAGO, Aug. 14—The racing clans are gathering for the American Automobile Association's national stock chassis road races which will be run at Elgin August 25-26. Several have been in camp for a week past, but the bulk of the drivers get there this week. The Alco team has been at the course for a week now, Maisonville of the Corbin and Jeffkins of the Velie have been out there several days, while others came in to-day.

Official practice starts Friday and from 11 a. m. to 1 p. m. each day the throttle can be opened under the supervision of the officials. Flagmen will be on duty, and in addition three officials of the Motor Race Drivers' Association will be present to superintend the practice. It is the intention of the Chicago Motor Club to have a medical examination of the drivers and if any of them are deemed incapacitated they cannot start.

Only one entry has come in since last week. The Ford Motor Company has nominated a car for the Aurora cup with Frank Kulick to drive. Now there are thirty-three entries in the four events. In the Elgin National for the under 600 class there are: Mulford in a Lozier; two Nationals, drivers unnamed; Grant, Lee and Hartman in Alcos; De Palma and Wishart in Simplexes; Buck in a Pope-Hartford; Hughes in a Mercer, and Burt in a Cino.

The Illinois cup race on the first day, for the 301-450 class, only has four named so far, two Nationals and a pair of Velies, with Stickney and Jeffkins as the Velie drivers. In the Kane County cup for the 231-300 class, there are three Falcars, three Stavers, three Colbys, two Coles, two Mercers, two Cinos and a Corbin. The Aurora cup race for the 161-230 class has in it an Abbott-Detroit to be driven by Mortimer Roberts and a Ford to be handled by Frank Kulick.

Additions to the prize list have been made by the accessories people and now there is hung up a total of $5,250 exclusive of the cash offering of the Elgin Automobile Road Race Association, $2,500. The Remy Electric Company to-day gave $1,200 conditional on the winners using Remy ignition, $250 for first, $100 for second and $50 for third being offered in the Elgin National, Illinois and Kane County. The Dorian Demountable Rim Company is offering $250 to the first man finishing on Dorian rims in the big race, $150 for the first one in the Kane County and $100 in the Illinois. The makers of the Sears & Cross type of speedometer will give $200 to the users of their device.

New Knox Water-Tower Tried Out

Springfield, Mass., had its first glimpse of an odd-looking piece of fire-fighting mechanism the other day when the new Knox water-tower, designed by Charles H. Martin, was tried out in the vicinity.

The device consists of a steel frame, carrying a motor and transmission machinery which is placed in front of a fire engine, or other apparatus, designed to be horse drawn. It rests on the front axle of the vehicle to which it is attached. In front it is supported by a single wheel, or two wheels placed close together. This construction gives it a more or less freakish appearance, but is said to be necessary in order to make short turns and handle the vehicle in narrow streets.

The frame is supported on easy springs in both front and rear, which prevents the engine and drawing mechanism from being shaken to pieces on rough roads. The engine is geared by means of chains and sprockets to the front wheels of the vehicle, the whole making a complete motor-drawn piece of fire-fighting apparatus.

Mead Temporarily Heads General Motors

DETROIT, Aug. 14—An event of general interest throughout the trade is the departure of President Neall of the General Motors Co. to Europe on a prolonged trip.

During his absence the affairs of General Motors will be managed by what is known as the "President's Council," of which W. J. Mead, vice-president of the company and manager of the Oldsmobile plant, is chairman. Mr. Mead will move his headquarters to Detroit during Mr. Neall's absence. The other members of the council are Gleeson Murphy, assistant to the president; treasurer, James T. Shaw; secretary, Standish Backus, and director of production, Tracy Lyon.

Rebuilding Old King's Highway

SANTA BARBARA, Aug. 14—One of the most unique good roads campaigns ever conducted in this country is at present being waged there. It has as its object the raising of the sum of $100,000 for the construction of what will be known as the Rincon road.

The Rincon will be a sea-level road, from Ventura to Carpinteria, 12 miles south of here, shortening the distance along the coast road 9 miles and, what means more, overcoming the dangerous Casitas pass.

This pass is one of the dangerous features of the coast highway. It has many turns. The road is narrow and is impossible to keep in fair condition at all seasons of the year. To a tourist who is not thoroughly familiar with it danger lurks at every turn.

Half of the money needed is being raised by voluntary subscriptions, and the main campaign is being conducted from here, the Santa Barbara Chamber of Commerce having taken the initiative. Acting on the most important sub-committee are Milo M. Potter, proprietor of the Potter Hotel; Louis Jones, president of the Chamber of Commerce, and Phil H. Rice.

Water tower, with Martin tractor in front, recently built by the Knox company for the Springfield, Mass., fire department

$1,000,000 Company to Make Motors

FLINT, MICH., Aug. 14—The Mason Motor Company has filed articles of incorporation with the Secretary of State.

The capital stock is $100,000. All of the capital stock has been paid in, it is reported.

The new concern will engage in the manufacture of engines for automobiles and plans have been made for carrying on the business of the company on an extensive scale.

The company has closed a two years' lease of a large four-story building in the Fourth ward, adjoining the Flint wagon works, which will suitably lend itself to the purposes of the new company. The building is 85 x 65 feet and has a flood space of about 5,500 square feet.

The plant will be ready to begin operations in about two weeks and it is expected that by next spring it will give employment to at least 500 skilled mechanics. The capacity of the plant will be forty engines per day.

The Mason company will make engines for the new Chevrolet cars, which are to be built in Detroit until a permanent site for the Chevrolet Motor Company's plant is selected.

The principal incorporator of the new company is Arthur Mason, of Flint, who will have entire charge.

Part of the battery of White trucks which took care of the transportation end of the recent maneuvers of the Massachusetts militia

Six-Cylinder Knight Introduced in America

The 1912 announcement of the Stoddard-Dayton car brings forth the fact that the six-cylinder Knight with the cylinders cast in groups of three has found its way into this country. The practice of casting the cylinders in groups of three has been in vogue in Europe and it has been found that with the seven-bearing crankshaft great rigidity can be obtained.

While the anouncement of the 1912 Stoddard-Dayton cars includes twenty-five different models, there is one type which perhaps will excite as great an interest as any of the products brought out during the present year, since it embodies the introduction of the six-cylinder Knight motor to America.

This motor is placed in six different types of bodies; a seven-passenger touring, seven-passenger limousine, and six-passenger torpedo. The same chassis reduced to a wheel base of 122 1-2 inches is adapted to a four-passenger torpedo or a two-passenger roadster.

Convenience has been made an aim by providing large and water-tight baggage compartments on the roadster, which can conveniently carry two large suit cases.

Midsummer Show Is Planned

DES MOINES, IOWA, Aug. 14—Des Moines automobile dealers will hold a big automobile show in connection with the Iowa State fair, the last week in August. W. E. Moyer, president of the local dealers' association, C. G. Van Vliet, secretary, and George Harritt are in charge of the affair and 30,000 square feet of floor space has been reserved by the local dealers. A big floral parade is to be pulled off August 26.

Receiver for Fal Company

CHICAGO, Aug. 12—The Fal Motor Co., of Chicago, maker of the Falcar, went into the receiver's hands to-day when Referee in Bankruptcy Wean named Edward C. Day, a lawyer, as receiver. The application was made by a creditors' committee consisting of H. K. Gilbert, of the Buda Co., A. H. D. Altree, of the Bosch Magneto Co., and H. H. Seaman, of the W. S. Seaman Co. The value of the assets is placed at $75,000 and the liabilities at $150,000

Just what the receiver will do has not been determined. An inventory is being taken now and when that is completed a policy will be outlined. However, it has been determined to finish up the cars now on hand. The creditors' committee has made a statement relative to the receivership appointment.

Trucks Take Place of Wagon Train

Among the trucks used in connection with the recent maneuvers of the National Guard of Massachusetts were a number of standard types of three-ton capacity. The trucks, numbering about twenty, were used by the troops in place of the antiquated wagon train of other days. The trucks did the work of fifty or more wagons and demonstrated that the automobile is vastly better adapated to this sort of work than the horse-drawn wagon. There were five Whites and several Kissel trucks.

Axle Plant Much Enlarged

JACKSON, MICH., Aug. 14—The new Lewis Spring & Axle Company plant, Horton street, is nearing completion. It will afford employment to about 200 additional men. The Park avenue plant of the company will be vacated upon the occupancy of the new building.

The new factory is 250 feet square and has a total floor space of 62,500 square feet. It is a one-story structure of light red brick with ample provision made for fine light and ventilation

Mitchell Agents Prepare Campaign

RACINE, Aug. 14—On August 11-12 about 100 agents of the Mitchell held a reunion at the factory of the Mitchell-Lewis Motor Company, Racine, Wis. They inspected new models and lined up a campaign for the coming year under the direction of Wm. L. Day, general sales manager.

Shiland Takes Hold of Westcott Sales

RICHMOND, IND., Aug. 14—H. E. Shiland has been appointed general sales manager of the Westcott Motor Car Company. Mr. Shiland was formely sales manager for the Buick Motor Company.

Will Sell Matheson Cars

WILKES-BARRE, PA., Aug. 14—The Matheson Automobile Company, of Wilkes-Barre, announces the appointment of H. De Long Fry, of Albany, N. Y., as assistant sales manager.

New Things Among the Accessories

Gasoline Economizer and Filter

PERFECT vaporization of the gasoline used as fuel in internal combustion engines is an absolute requirement for success along this line of endeavor, and while this need is recognized by all engineers there are many of them even to-day who look at an incomplete evaporation as a necessary evil that there is no way to avoid. The cause of inefficient vaporization lies often in the construction of the carbureter nozzle, resulting in a thin and straight jet rather than the formation of a broad cone of gasoline-air mixture. While a good deal of gasoline is vaporized even by the nozzle termed inefficient, the gasoline is not torn up in globules small enough not to accumulate in drops when striking the metal surface of the manifold. Under the circumstances it is even difficult to prevent liquid gasoline particles from entering the combustion chamber, where it has to be vaporized by the engine heat of combustion, thus detracting from the useful work of the machine.

In Fig. 2 is shown the proper way of atomizating the gasoline, which, when leaving the nozzle, is torn up into infinitely small particles and by centrifugal action made to form a cone-shaped mist. At (B) the effect of a straight-jet nozzle is shown, and while the illustration may be somewhat exaggerated it serves well to bring out the difference of the two principles. The reason for this difference in action lies in the manner of construction of the two nozzles used, and, broadly speaking, the pressure under which the liquid is expelled through the nozzle orifice. As will be seen, the pressure is much higher in the case of the conical spray than where the straight jet is formed.

The conical spray here reproduced has been obtained by the use of the Mills petrol economizer and filter, three views of which are shown in Fig. 3. At (A) it is seen how the economizer is made so as to screw into the passageway leading from the float chamber to the vaporizing space, while (B) illustrates the arrangement of the economizer for use in the well-known Longuemare carbureter. The economizer B having an outlet A is fitted in the vertical continuation of the passageway H by the use of a flange D tightened by the leather washer E which prevents the gasoline from flowing upward through the holes G. F is the economizer inlet. The construction of the device itself is brought out in (C) where D is a stationary nozzle located inside the outer nozzle A1. The adapter A which helps to fit the economizer in a carbureter instead of the nozzle furnished therewith contains a wire-gauze filter which keeps all foreign matter from entering the inner economizer space B. After passing through this filter, the gasoline flows up through the tube D, leaving it through two skew holes at the top. By this arrangement the liquid is made to swirl before it leaves through the orifice C, and this revolving motion in addition to the high pressure created by the use of the cylindrical space C results in centrifugal action which throws the gasoline out toward the sides of the nozzle, causing it to form the conical spray on account of its being mixed with the atmospheric air.

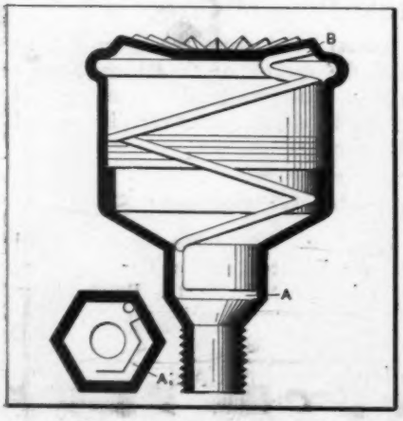


Fig. 1—Merchant & Evans securely fixed grease cup

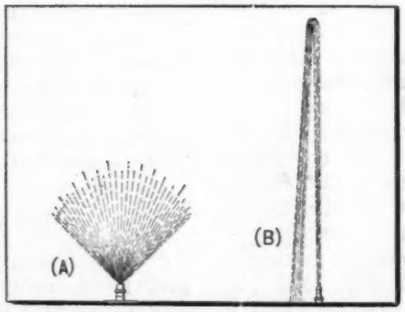


Fig. 2—Gasoline atomized spray and straight jet

The economizer and filter is made by H. E. Mills, 441 Brighton Road, S. Croydon, Surrey, England, and is applicable to the use of gasoline, benzol or paraffine. The size of the engine may necessitate an enlargement of the orifice C, but in making this adjustment care must be taken so as to make the hole not too wide, since this would tend to destroy the conical shape of the gasoline-air jet and to form a straight jet, thus robbing the device of one of its most valuable features.

Securely Attached Grease Cup

MANY parts of the automobile are lubricated by means of grease cups which are filled with the lubricant and then left in place for a number of days or weeks. This makes the method of lubricating such parts a very comfortable matter, or would make it one were it not for the fact that in course of time the caps of grease cups tend to come off and that, therefore, it will be necessary for the automobilist to inspect, at frequent intervals, the places so lubricated, only to find out whether the grease cups are still in place.

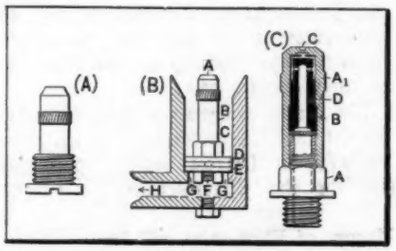


Fig. 3—Details of Mills Economizer and Mixer

To relieve a strained situation, an attempt has been made to construct a cup that won't come off, which is shown in the accompanying Fig. 1, it being a product of the Merchant & Evans Company, of New York, Chicago, etc., known as manufacturers of transmissions, alignment joints and so forth. The grease cup mentioned contains a spiral wire, as may be seen from the illustration, one end of the wire is hexagonally shaped, fitting in the hexagonal shank shown at A, its form positively preventing it from turning.

The other end of the wire is made to act as a pawl. Looking at the top of the cup reveals a corrugated surface, and the end of the spring B engages with this corrugated surface, but does not interfere with the screwing down of the cap. Turning the cap causes the wire end to slip from one corrugation to the other, holding at the same time the cap in secure relation. As the wire is spiral in shape it serves as a spring holding the pawl end firmly against the top of the grease cup. The operation of this type of cup if exactly the same as that of any other kind, by means of the fingers of one hand, the interior wire mechanism adding no complication to the handling of the device.

Solderall Compound

SOLDERING is an operation which, according to general belief, requires a very hot flame, a blow-torch and consider-

able skill to get up a good connection between two pieces of metal, but there has appeared on the market a pure tin solder which permits of soldering without the appliances heretofore considered absolutely necessary for doing this work. The tin contained in Solderall, as the compound is named, is combined with a non-corrosive flux having the consistency of a paste, which melts at the low temperature produced by a burning match. After cleaning the metal surfaces to be soldered from the oxide, which always covers such exposed parts, a little paste is smeared over them, and after placing them together in the position that they are desired to hold after

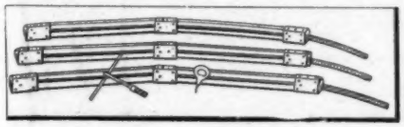


Fig. 4—Elements of the Fudge emergency tire

soldering, heat the parts covered with the paste by means of a match, a candle or a torch. The special composition of the solder assures its melting within a few seconds, after which the metal parts are allowed to cool off. A test made will show that the work has been done efficaciously, and the solder will be at least equal in strength to the component members. This solder is made and marketed by the H. W. Johns-Manville Company, of 100 William street, New York.

Sectional Emergency Tire

IN Fig. 4 the elements of the Fudge Emergency Tire are illustrated, and, as the cut shows, they are in the shape of flexible but solid strips of material, being capable to be connected up by the operation of a simple mechanism. A flexible rack is securely fastened to one end of a tire element, while the other contains a guideway for the rack. This guide contains another rack meshing with the teeth of the rack first mentioned, and also with a pinion stationed in the center of the tire element.

If it is desired to mount the Fudge which is applied over the regular pneumatic tire, the three elements are connected by means of the racks, leaving the tire ring open in one place, as indicated in Fig. 5. Then the emergency tire is placed on the floor, taking care to get no grease on the emergency tire, since this substance does it no more benefit than it renders a pneumatic. The wheel on which the Fudge tire is to be mounted is then rolled on the emergency tire, until the position illustrated in Fig. 5 is reached. Thereafter the opening between the two tire elements shown in the figure is closed up by locking the two racks, and to tighten the elements of the tire against each other the pinion wrench shown in Fig. 4 is used. The wrench is inserted into the opening located in the center of each element, and since it fits the hub of the inner pinion it is possible to turn the latter by means of the wrench, thereby bringing the two racks into closer engagement. This procedure is continued until the ends of each two elements meet, when sufficient tension will obtain. In order to remove the emergency tire from the wheel the release pin seen in Fig. 4 is used. For this purpose the pinion is given a short turn with the wrench, tightening it a little, and then the release pin twisted as far as possible toward the pinion; thereafter the wrench is made to turn the pinion in the opposite direction and promptly unlocks the racks it controls.

While the two illustrations here given are of the three-section type of emergency tire, the Fudge Brothers Manufacturing Company, of Marion, Ind., also make a two-section and a four-section type, the operation of which is identical with that of the three-section class.

Auto Heel Rest

FATIGUE is the demon that interferes with efficiency in personal work, and to increase efficiency some men directing manual or, speaking more generally, cor-

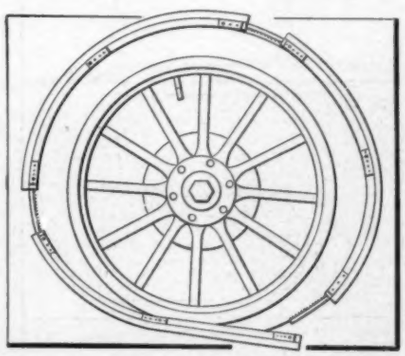


Fig. 5—Mounting the Fudge on a pneumatic tire

poral labor, have found it of advantage to make a study of the motions of which the operations of the laborers are composed. It is the useless strain that brings about early fatigue and, remembering that the chauffeur, who is bound to keep his foot on the pedal when driving, does the work with his sole, it would be a step in the right direction were he to be freed of the hard work of pressing his heel against the floorboard without finding a positive fulcrum.

Recognizing the reduction of the useless strain on the chauffeur if his heel is afforded a positive resting place, L. Lucas & Son, of 3 Fox street, Bridgeport, Conn., have constructed and placed on the market the simple and practical footrest which is shown in Fig. 6. The footrest here illustrated is cast of aluminum and in the shape of a rectangular prism, 4 inches long by 2 1-2 inches wide, and about an inch high. There is no baseplate, but in-

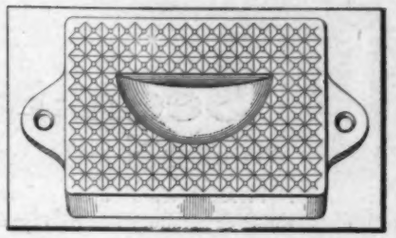


Fig. 6—Auto heel rest, which is cast of aluminum

stead of it two flanges are cast integral with the two vertical sideplates, permitting the footrest to be attached to the footboard by means of two screws and nuts. The footrest is preferably attached so that the foot poised on the cavity of the footrest in in position to operate the accelerator. In addition to giving the heel a strong hold, the Auto Heel Rest brings the foot higher up, which permits the driver to work with his foot with less strain on the muscles of his leg, thereby protecting him from unnecessary and early fatigue in driving.

Coupling the Magneto to the Drive

THE coupling illustrated in Fig. 7 consists of two parts, one being cone-shaped with a crown end, while the other is a cross-piece of special construction. The crown carries two diametrically opposed slots which are lined with fiber. In these slots fit the ends of the cross bar, which on examination is found to consist of a great number of laminations of fine spring steel. By virtue of the spring the looseness and pounding, which may be produced with the ordinary coupling under varying resistance to the rotation of the armature, are entirely absorbed and the armature, in consequence, runs with much greater smoothness than is obtainable with any former type, and with absolute silence. Furthermore, there is sufficient spring in the cross section of the laminations composing the cross-bar to permit the magneto to run with the armature shaft at an angle with the drive shaft.

The coupling thus becomes a universal joint, for it not only gives a drive with the two shafts off center, as is the case with the ordinary Oldham coupling, but in addition permits the shaft to run out of line. This coupling is made by the Bosch Magneto Company, 225 West 46th street, New York City.

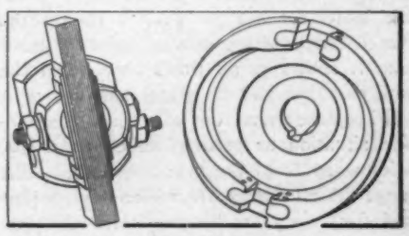


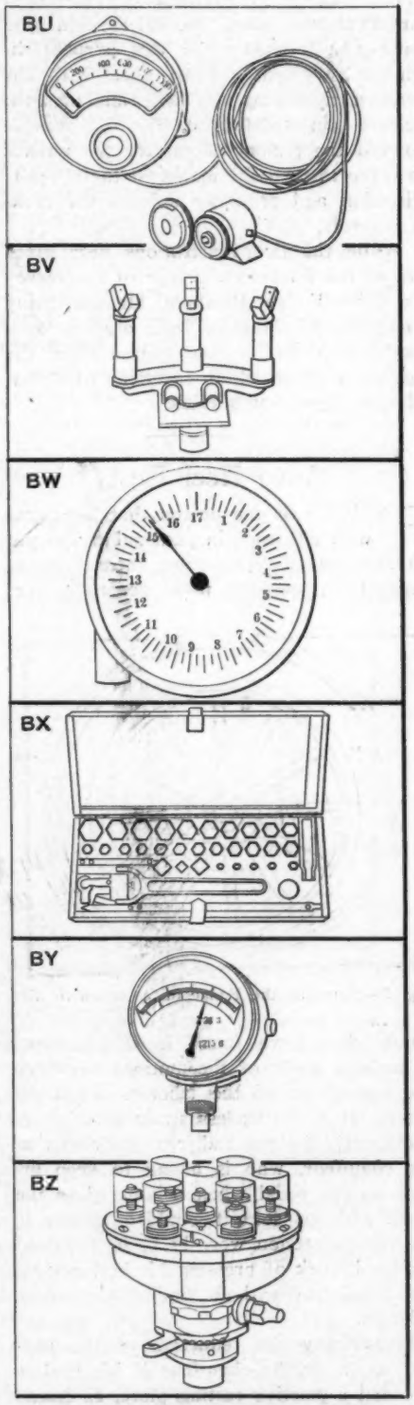
Fig. 7—Bosch coupling for driving the magneto

Seen in the Show Window

PRECISE measurements are at the foundation of standard methods of production, and they are applied not only to the material as it is worked into the machines being made, but the power output and its component factors are also submitted to a series of exacting tests. The tachometer, shown at BU, is built for exact measurements of the engine r.p.m. and consists of a dial upon which the speed of the engine is indicated, the operation being similar to that of an electric meter. To measure motor speed, the part of the tachometer, which is connected to the dial by insulated wiring and which contains a small direct-current magneto, is applied to the engine to be tested in the usual way. The strength of current in the magneto varies directly with the engine speed actuating the magneto, so that correct readings are obtained for all the r.p.m.'s indicated on the dial. It is made by the Electric Speedometer Company, of Washington, D. C.

OBVIOUS advantages accompany the use of acetylene in automobile illumination; brightness and cleanliness are the principal virtues of this system hardly to be surpassed for effectiveness. The Tri-Radiant burner BV is so constructed as to light the road in front of a car as well as the fields alongside of it. A triple burner, of which this lighting system has derived its name, produces enough light to brightly illuminate the road as well as the portions of the land neighboring it, the effect of the triple burner being assisted by a system of lenses which properly distribute the light. This type of burner is handled by the Lenhart Manufacturing Company, Inc., 246 North Delaware avenue, Philadelphia, Pa.

LIMITED as the supply kept in the gasoline tank must necessarily be, it is bound to give out at some time or other, and the automobilist generally finds himself in an out-of-the-way locality when the emptiness of the tank manifests itself. To avoid such a situation a gasoline gauge will be a useful accessory to install on an automobile. In this connection the Smith gasoline meter, shown at BW, is interesting. Placed on the dash, in a conspicuous position, it shows at all times how much the tank contains, and an occasional look at it will keep the driver out of such a disagreeable situation as getting stalled on a hill, miles away from the nearest garage. The gauge fits all makes of cars and is guaranteed for two years by the Smith Gasoline Meter Co., 1777 Broadway, New York City.



BU—Electric Speedometer Company's Tachometer for measuring engine speed
BV—Tri-Radiant acetylene has wide range and great illuminating power
BW—Smith gasoline gauge saves trouble arising from an empty fuel tank
BX—Bay State autokit overcomes stubbornness of standard-dimensioned nuts
BY—Sears-Cross speedometer opens the driver's eyes in regard to his speed
BZ—Leavitt distributor simplifies internal-combustion ignition systems

INACCESSIBILITY of nuts is a derogatory feature of chassis construction, but it stands to reason that to get at these unruly portions of the automobile's mechanism is no more difficult than to screw them on. It is only a matter of having and using the right kind of tool, and a normal amount of mechanical skill will suffice to get at and remove the nut in question. In the Bay State Autokit, which is illustrated at BX, a substantial wrench is contained, together with the necessary fittings to give it a solid grip on all standard-dimension nuts. The equipment is handy and takes up little room, being enclosed in a flat case, and is sold by Geo. A. Cutter, Taunton, Mass.

IT is of great importance for the driver to always know the speed at which his car is traveling, and speedometers are today part of the equipment of practically all cars in operation. One of the popular types is here shown (BY); it is made by the Sears-Cross Company, of 687 Eleventh avenue, New York City, in five styles. There are no magnetic parts contained in this speedometer, and its operation is purely mechanical, so that it may well be expected to work correctly under all weather conditions. As the illustration shows, the dial contains a speed indicator, showing the velocity up to 60 miles an hour; also a trip mile indicator, which may be set to zero at the will of the operator, and the "total" mileage indicator, showing the number of miles traveled by the car since the installation of the speedometer which is placed on the dashboard.

THE early introduction of multiple-unit coils is largely responsible for their being found in far more ignition systems than are distributors combined with single-unit coils. This statement is proved by the fact that owing to the merit of distributors these are continually being used, and to some degree, increasing in numbers, and are giving satisfactory results. The Leavitt Improved Distributor (BZ) is made to work on from ¼ to ½ ampere current, while the timer vibrator can be adjusted to take from 1½ to 2 amperes. As a result of these excessive burning is caused at the contact points. In the Leavitt the points are made of iridium, an inert metal subject to no chemical changes in consequence of the electric strains placed on it. The distributor here shown is made for engines with any number of cylinders, from two to eight, by the Uncas Specialty Company, of Norwich, Conn.